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ZX COMPUTING MONTHLY



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Screenshots from Spectrum 48K

AMSTRAD BUY SINCLAIR

Sinclair Research has sold off its entire interest in the home computer business to Amstrad.

The £5 million deal gives Amstrad worldwide rights to sell and manufacture all existing and future computers and computer products. Amstrad have also bought the rights to use the Sinclair brand name. The Sinclair name will not however disappear. It is Amstrad's intention to continue producing 'Sinclair' computers for the "entertainment end of the market while existing and planned Amstrad machines will be aimed at the serious user and business sector."

At the press conference to announce the sale, Sir Clive said, "We were the pioneers in the home computer field but we are now handing over, rather later than we perhaps should have done, to experts in marketing."

Alan Sugar, Amstrad's Managing Director, commented, "It's a good deal for us. Sinclair has dominated the entertainment field in Europe and we are now adding an additional section to our business."



Sir Clive: handing over to "the experts in marketing."



Alan Sugar: "It's a good deal for us."

Quality control

Asked about his plans for Sinclair machines, Alan Sugar said, "We are going to look at quality control in the production of Sinclair computers and at enhancements. We plan to study the reasons why Sinclair products have given rise to rumours of poor quality. Part of the problem has been that producers of Spectrum software tend to try and get as much out of the machine as possible which can lead to problems. At Amstrad we advise software houses on writing software for the machines.

"We would intend to set up a quality control software advisory service to help third party software houses. There would be a logo which would appear on approved software and consumers would be encouraged to buy this software."

Enhancements

One enhancement that Amstrad have in mind for the Spectrum is the addition of a built-in tape recorder.

"Many problems have come from using tape recorders and a way of overcoming this would be to glue on a tape recorder at the production stage."

Alan Sugar envisaged that the unmodified Spectrum + and 128 would still be sold "going into 1987."

As for the QL which has now ceased production the future is far more uncertain.

"We are committed to take over the whole of the Sinclair inventory and any work in progress. The QL did not attract the best publicity when it was launched and we would forsee a destocking of that product," said Alan Sugar.

Later when asked about whether he had plans for using the QL as the basis for a new product, he said, "We would be prepared to look into the architecture of the QL and see if the product could be reborn perhaps with a disc drive rather than a microdrive."

For the future?

Sinclair research has also "floated off" other parts of the company including the Winchester based business dedicated to innovatory telecommunications products and a new company is to be set up to develop wafer scale semiconductor products.

One product in the pipeline is a single chip with 40 megabytes of memory.

"Each satellite company will be able to attract finance, appropriate partners and exceptionally talented researchers. We will also go on building teams in other areas of technology and develop them into self-financing entities as they reach maturity."

Sinclair Research remains as a "project development" company and its development work still includes the Pandora portable.

"We are continuing with the project and will talk with Amstrad about it but if they are not interested then we will go elsewhere," said Sir Clive.

Under the new set up, if Sinclair Research dream up a new games machine they can offer it up to Amstrad to handle. But if Amstrad decline, Sinclair Research are at liberty to find an alternative marketing solution but without the use of the Sinclair name.

Amstrad entered the home computer market only two years ago and have now incorporated Sinclair computers into their business. At a stroke Amstrad have increased their market share of home computers from 20% to 60%.

Global Turkies

Hot on the heels of Attack of The Killer Tomatoes, Global Software are preparing to release the next two games in the Golden Turkies series, based on some of the worst film of all time. Carrying on the vegetable theme you should soon be able to play Curse of the Mushroom People, which will be followed by The Wild Women of Wongo. I bet you just can't wait...

Neverending Saga

Saga Systems, purveyors of keyboards to all the best people, have announced plans to release two more add-on keyboards and a word processor for the Spectrum within the next few months.

The first will be the Saga 2+, followed by the 'luxurious infra-red controlled' Saga 2001. And if that sounds a bit space age, it's intended to. Saga's David White says that it will be 'the most sophisticated keyboard for any computer under £10,000. It will be more at home in the 22nd century, or on the bridge of one of Science Fiction's space ships.' Gosh, all that for the humble Speccy!

On the Bench

Talent Computer Systems have announced plans to release a complete package for editing and debugging assembler programs on the QL. The Assembler Workbench will feature a full screen editor, assembler and a monitor/disassembler. Priced at £24.95 the package should be in the shops this month.



Unexpurgated St Bride's

The ladies (?) at St B's have sent us another one of their jolly missives to let us know what they're getting up to these days. It seems that the Donegal Damsels are about to commit the ultimate sacrilege. Having flogged their Snow Queen game to Mosaic, they've now gotten CRL to publish their next game, Unexpurgated Caves, a send-up of Colossal Caves, the game which started the adventure genre. They're not saying much, other than that this is the game that was considered 'too silly to put before the public'. Nonetheless it will be out towards the end of April.

Sammy expands

Martech, producers of the, shall we say 'eagerly anticipated', Samantha Fox Strip Poker and 7 Card Stud game have announced that they will be producing an 'expanded' version for the Spectrum 128. It seems that Sammy's graphics and game play are going to be enhanced because of the extra memory available, and if you're thinking smutty thoughts then shame on you!



Who, where, when?

April should see the eventual release of the Spectrum version of Dr Who and The Mines of Terror from Micro Power. The game pits the Doctor against his arch enemy, The Master, as he attempts to prevent him from constructing a Time Replay machine that will let The Master rule the Universe. Micro Power claim that the game will have over 100 screens and will present you with some mind-boggling problems — all this for just £11.95.

Level 9 Magik

As you read this, Level 9 should just have launched their latest adventure, The Price of Magik, for the Spectrum. This is the sequel to their earlier Red Moon and contains a thousand word vocabulary, and two hundred illustrated locations and a number of independent characters. The game was due to be launched at the CES show, where Level 9 were also planning to preview their first QL game. Colossal Trilogy is an enhanced collection of Level 9's Middle Earth games which are combined to make one huge mega-adventure. Priced at £9.95 and £19.95 respectively, it sounds like Level 9 will at last stop our adventure columnist complaining about the lack of good adventures.

Spectrum Games Top Ten

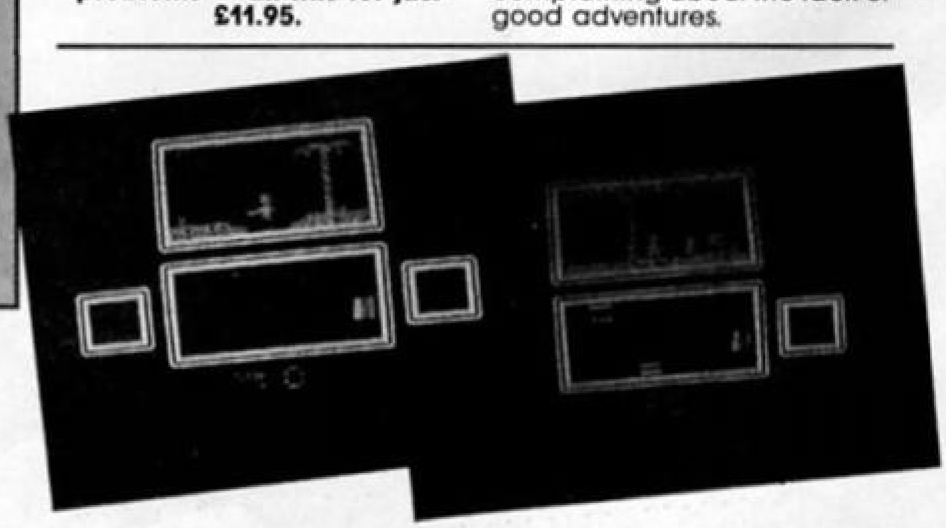
1	Way of The Tiger	Gremlin Graphics
2	Movie	Ocean
3	Twister	System 3
4	Computer Hits Ten Volume 2	Beau Jolly
5	Yie Ar Kung Fu	Imagine
6	Winter Games	US Gold
7	Rambo	Ocean
8	Crash Smashes	Gremlin Graphics
9	Ping Pong	Imagine
10	Daley Thompson's Super Test	Ocean

(Chart supplied by W.H. Smiths)

Chart watchers from last month may have noticed the accidental introduction of a totally new and fictitious software house, Queen, who were credited with producing the number one game Movie. Apologies to Ocean and a sharp rap on the knuckles for Queen whoever they may be who should go out and create their own games in future.

Hocus Focus

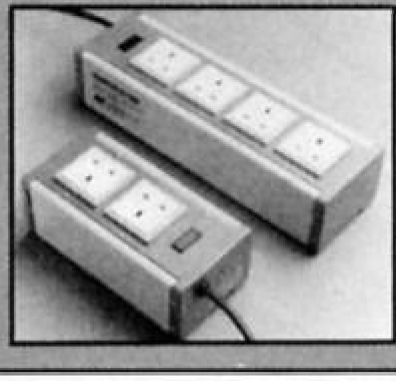
We've got screen shots of the latest Quicksilva game, Hocus Focus, but apart from the price (£7.95) we don't really know an awful lot about it. Still, Quicksilva say it's about finished so perhaps we'll review it next month.



Mosaic's games

Mosaic Publishing, who unleashed the Adrian Mole computer game upon us, have announced that '86 will see a follow up to the game called The Growing Pains of Adrian Mole. Like the first Mole game, Growing Pains will be programmed by Level 9 who will also be working on another game for Mosaic, based upon — wait for it — The Archers (the mind boggles doesn't it? Well, yours might not but mine does frequently).

Not content with The Archers, Mosaic further intend to release St Bride's Snow Queen sometime around May, and The Story of The Amulet by the Ram Jam Corporation during the summer.



Power Protection

Another plug thingy designed to filter out fluctuations in mains voltage and protect your machine from untimely crashes has been produced by electronics company Cetronics. You'll be pleased to hear that the COMPUFILTER has an attenuation in excess of 40db at 150KHz and 30MHz common mode rising to more than 70db in the mid frequency band. Just what you've always wanted. Further details from Cetronics on 0920 871077.

Rainbirds of a feather

Rumblings over at Rainbird as they start expanding and appointing new people to handle the company's schedule of 'amazing new releases'. The chap below is Mike Clark who will be taking over as Sales Manager. Mike will also be joined by Paula Byrne (formerly of Melbourne House) who will be Deputy Manager and Marketing Manager, and Paul Hibbard (author of Rasputin) and Philip Mochan (part of the Gyron team) will be heading up program production. Now if Rainbird would just tell us what these amazing new releases are, we might be able to let you know as well.





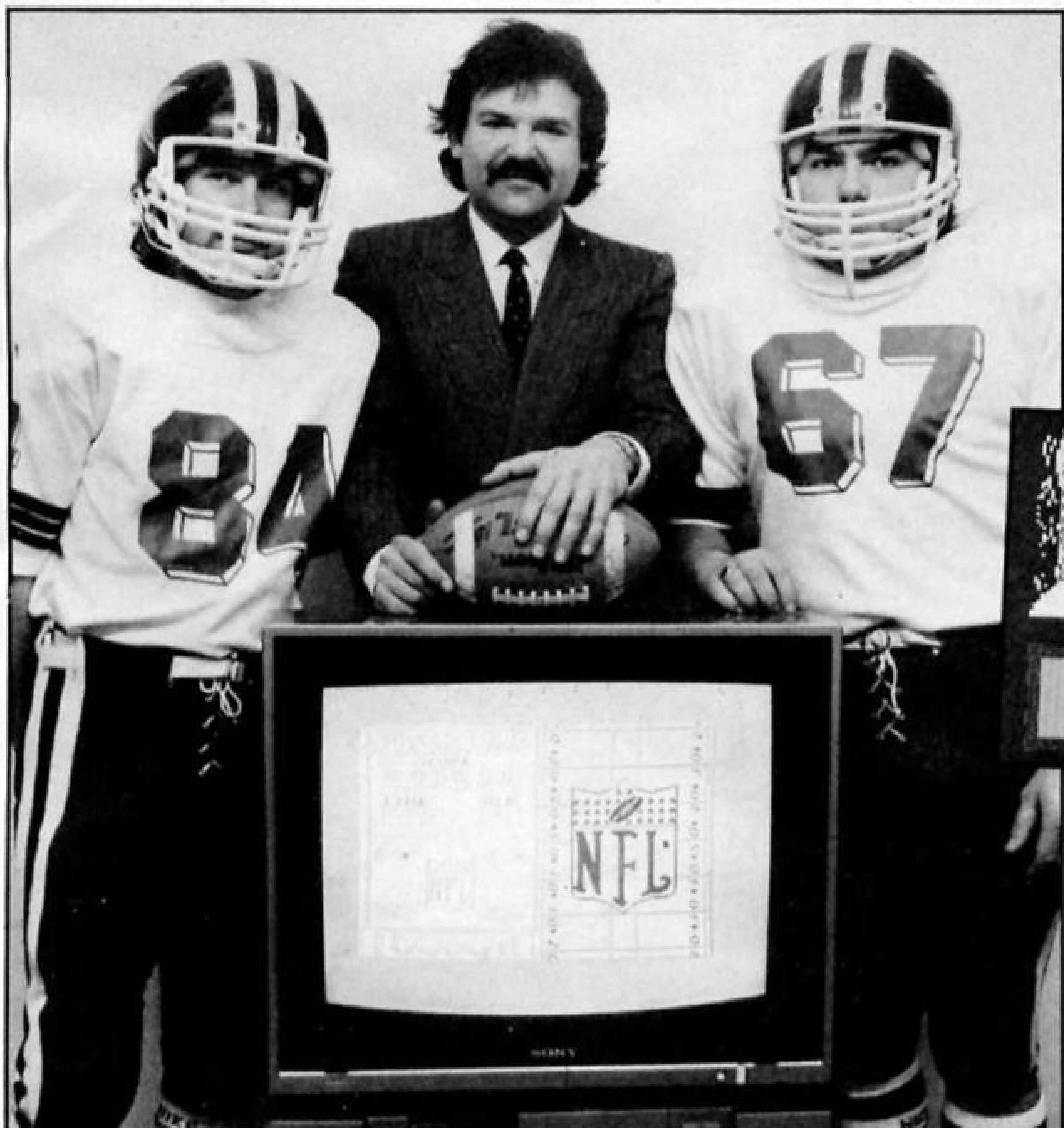
The Comet Game

. . . is the latest release on Firebird's 'Hot' range. It's a three part game which involves saving the earth from the yucky little germ bags that lurk in the comet's tail. The first two parts of the game take you in your space craft as you attempt to intercept the comet with the aid of your onboard computer, Herbie. The final part is a shoot-em-up in which you have to zap the germs before they reach the earth. The Comet Game will cost £7.95.

Heavy on the software

Gargoyle Game's latest epic, Heavy on The Magick, is scheduled for April release, and a screen shot from the game is featured below. It sounds like this is going to be a busy year for Gargoyle: they're getting ready to move into new offices, take on new staff and programmers and, in September, launch a new label aimed at the arcade sector of the games playing public. The new label will be launched at this year's PCW show, and Gargoyle claim that "If Gargoyle is the Rolls Royce of home computer games, then the new label will be a rather souped up Jaguar!"





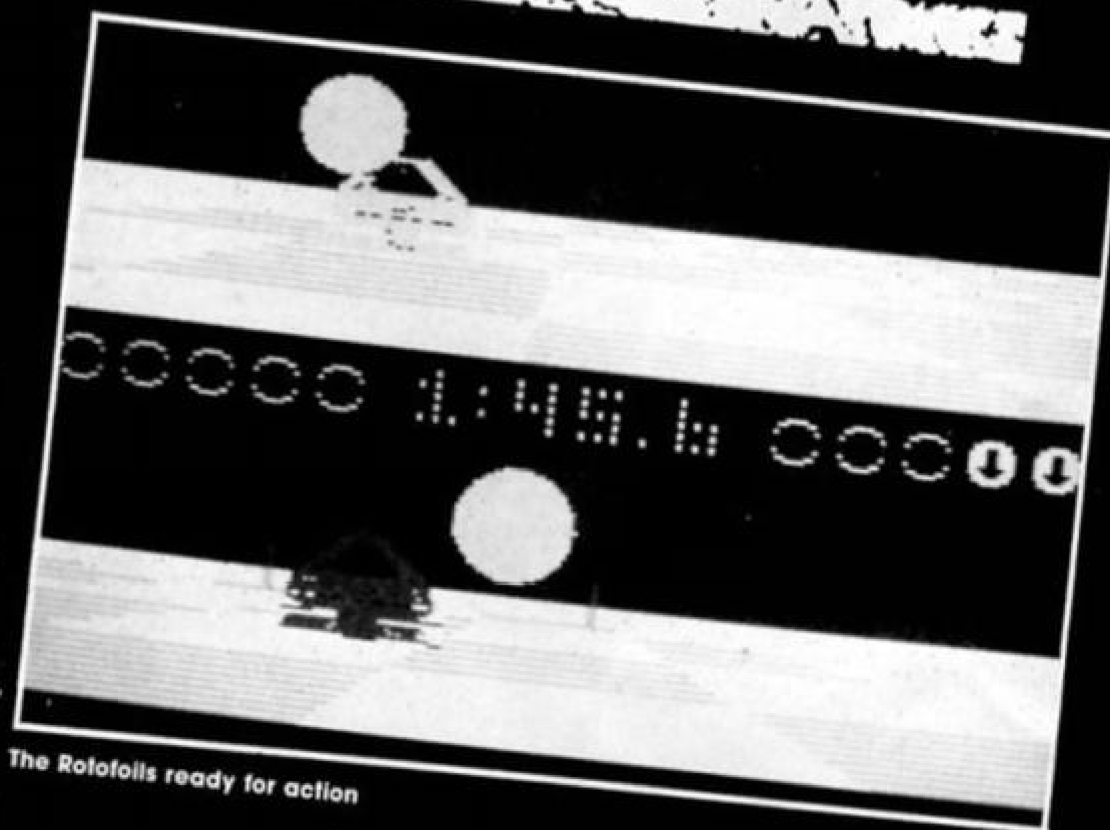
Bowled over

There we were, all ready to load up Superbowl, Ocean's new American football game, when Ocean realised there were a few things not quite right with it. So, no review this issue, but at least you can have a look at Ocean's MD Jon Woods and a couple of crazed looking football players as they pose for a mug shot.

ballblazer™

COMPETITION

There are 50 copies of Activision's latest game from the Lucasfilm stable to be won this month.



The Rotofoils ready for action

Ballblazer is a high speed action game played on a faraway planet in the distant future. Competitors guide their hovering rotofoils over the grid-like pitch and attempt to blast an orb through their opponent's goal. The action is depicted by a split screen giving your perspective and your adversary's. Ballblazer can be played against a human opponent or against a selection of droids chosen by the computer.

Offering arcade thrills on the Spectrum, Ballblazer was originally created in America by the team at Lucas Film Games, an offshoot of Lucasfilms. To bring this futuristic game into your living room all you have to do is answer the question below.

The Big Question

Can you name three films which were directed by George Lucas?

How to enter

Fill out the coupon below including the names of three films directed by George Lucas and send it to ZX Computing, Ballblazer Competition, No 1 Golden Square, London W1R 3AB. All entries must be received by first post on June 13th 1986. Please also write your answers on the back of your envelope.

Rules

All entries must be on the coupon provided (no photocopies please), and the competition is open to all readers except employees of Argus Specialist Publications, Alabaster Passmore and Activision.

Ballblazer Competition Entry Coupon

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Address ....

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George Lucas directed the following three films:

1. ....
2. ....
3. ....

All entries must be received by first post on Friday June 13th. Send this coupon to Ballblazer Competition, ZX Computing Monthly, No 1 Golden Square, London W1R 3AB. Please remember to put your answers on the back of your envelope.

LOTHLORIEN'S

ARENA



ARENA

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Available for:
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AMSTRAD
£9.95



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Spectrum ....

Amstrad ....

I enclose a cheque/postal order for £.......... made payable to Argus Press Software.

Name..

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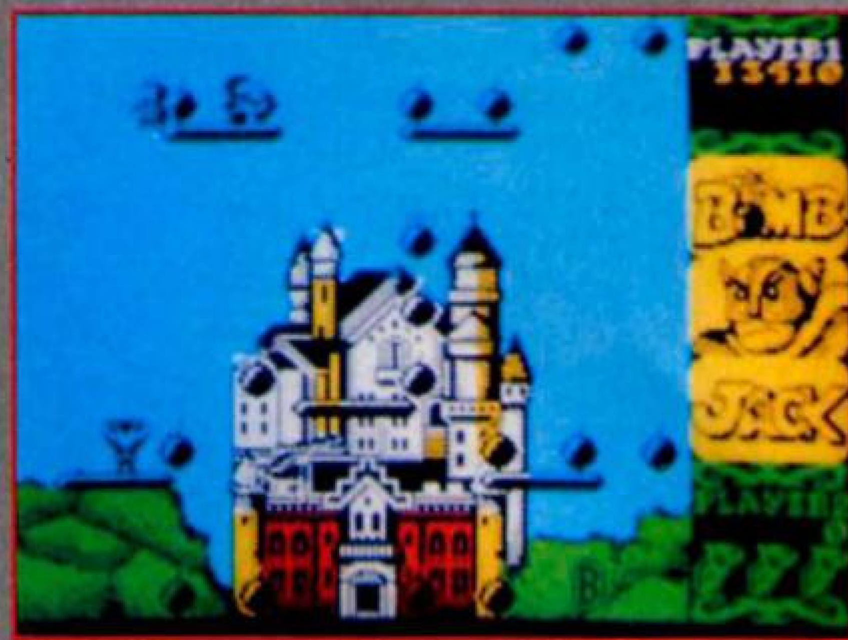
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Post to:
Argus Press Software, Units 1 & 2, Conlon Developments, Watery Lane, Darwen, Lancs. BB3 2ET
LOTHLORIEN, LIBERTY HOUSE, 222 REGENT STREET, LONDON W1R 7DB.

BOMB JACK





Elite
£7.95

Despite being a conversion of quite an old arcade game, Bomb Jack is one of the most enjoyably addictive games that I've played on the Spectrum for ages. It's one of those simple games that manages to be hugely addictive and leads you on to constantly try for the next screen or the highest score.

The plot of the game is virtually non-existent: Bomb Jack is a small figure who, in his cape and mask, looks like Mighty Mouse from the old cartoon series. Dozens of bombs have been placed in various locations around the world (the Pyramids, an old castle and so on) and it's up to Jack to defuse them all. The Bombs have been placed on groups of platforms and Jack gets to them by leaping around and landing on them to defuse them.

In addition to the bombs, there are a number of nasties that get in the way and which are deadly if Jack collides with them. There's a bird that flaps its way around the screen and a number of men in what look like space suits. These start at the top of the screen and gradually make their way to the bottom, where they turn into vicious looking insects and are also joined by little flying saucers. The longer you stay on each screen, the more of these you have to deal with, and after a while they all start to home in on you, which is when things start to get really frantic.

The controls are very simple, just left/right and jump, but mastering these controls so that you can have Jack zig zagging around the screen, avoiding deadly objects and getting to all the bombs isn't at all easy. Pressing the jump button once will let you jump, but repeated presses allow you to control the speed and height of the jump. Jack responds well to the keyboard controls, bouncing around quickly and smoothly and this allows you to make



some very nippy moves but the technique, though simple in principle, isn't easy to master. I started off by jerkily bouncing around the screen and bashing into platforms all over the place, but after a while I managed to get Jack smoothly nipping between deadly sprites and just dipping here and there to touch a bomb before moving off again.

The graphics are fairly simple, but reasonably well done. The background pictures are all quite finely detailed, but you do get the odd vanishing sprite when two sprites overlap from time to time, though this doesn't really detract from the enjoyment of the game. There are five basic locations, and as you get further into the game these reoccur with different and more complex arrangements of all the bombs. When you're trying to reach the bombs you can either go to the nearest ones and try to clear each screen as quickly as possible, or you can attempt to defuse them in order as their fuses are lit. This gives you a bonus for each bomb, but is risky as it takes longer and means that the insects and spacemen get deadlier all the time. This is a nice touch, since it means that even after you've learnt how to clear a particular screen there's still the challenge of trying to get the highest possible score.

Every now and then there are capsules which bounce around the screen, and collecting these will give you bonuses, extra lives or, like the power pills in Pac Man, will paralyse all the creatures on screen for a few seconds, allowing you to rush around stacking up points by killing them.

After producing some particularly naff games based on heavily hyped TV licensing deals, Elite finally seem to have struck an untapped vein of enjoyable arcade conversions. Bomb Jack, like their recent Roller Coaster does away with some of the hype, yet still manages to be simple, good old fashioned fun.


4
ZZAP! SIZZLERS FOR YOUR CBM 64/128
ZZAP! SIZZLERS
WHO DARES WINS II
Only the bravest volunteer for the ultimate suicide mission to free lost companions held prisoner by the armies of death, the forces of oppression. Only the fearless dare take up a challenge where courage and endurance are as essential as intelligence and skill. Compulsive. Action packed. Step forward, modern day hero, you'll never know how good you really are until you've tested yourself on the ultimate mission.
DROPZONE
It's the year 2085. Only a handful of people have survived the robot wars that rocked the Solar System. In a final desperate bid for survival a Tachyon propelled star cruiser has been developed on Earth to transport survivors to a new star system. But the cruiser relies on rare Ionian crystals for its power, crystals which are only abundant on Jupiter's second moon Io. It is your mission to escort the men and their precious crystals safely from the surface of Io to the Dropzone where the landing pad is located.
WIZARD'S LAIR
'Tis a legend told long ago
About dark caves far down below
Where deep within a Wizard dwells
Bespeaking doom and casting spells
If this lair thou dost uncover
Four pieces of lion thou must discover
Only then may you escape
Past the lion that guards the gate
So heed this warning and beware
Never venture into 'Wizard's Lair'
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The evil goblin is wreaking havoc on an unsuspecting world, casting spells and banishing its treasures to his underground factory deep in the bowels of the earth.
How can he be stopped? What can we do? Who can do it? There's only one saviour – our hero – Thing on a Spring!
Complete the magical jigsaw and break his fiendish spell.
DISK £14.95
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Who Dares Wins II
Wizard's Lair
Dropzone
Thing on a Spring
ALIEN 8
Long long ago ... in a distant galaxy, on a distant dying planet, the last of the guardians prepare their starship for its final journey. All of the libraries, records and knowledge have been stored aboard the vessel, along with the very best of their cryogenically preserved race. The planet's final end draws near as the last, most vital piece of equipment is loaded aboard, activated, and the hatchways closed. The ULTIMATE evolution ALIEN 8 cybot whirrs into an artificial cybernetic rush of intelligence.
All hatchways are sealed, as the starship prepares for its long uninterrupted journey into the inky void of space.
SPY HUNTER
The official home version of Bally Midway's 1st arcade hit.
• You control the turbo charged race car/hydro spy boat.
• You control a deadly arsenal of missiles, machine guns, oil slicks and smoke screens.
• Sophisticated spy-challenging graphics.
This is hardly a game. It's a high-speed test of your secret agent skills. Meet the challenge and survive Spy Hunter!
SPY HUNTER
SEGA
DUN DARACH
It happened that, following a fateful, bloody and largely pointless battle against the Conachta, Cuchulainn the Great was returning home to Murmethne in company of his faithful charioteer, Loeg, pointless because the enemy was a scouting party and not intent on taking the peak of Beann Ghulban, below which the battle took place, fateful because, amongst their number was Amhair, a Prince of the Conachta and the darling of his father, who vowed an instant revenge....
NIGHT GUNNER
48K SPECTRUM
NIGHT GUNNER
The air battle where only aces survive! Each of the 30 different missions pushes you to the limit with enemy fighters attacking from all directions, guns ablazing! – explosive 3D ground attack sorties, and there's still the flight home.
4
CRASH SMASHES FOR YOUR SPECTRUM 48K
CRASH Smashes
TAPES £9.95
Spy Hunter
Night Gunner
Dun Darach
Alien 8
Gremlin Graphics Software Ltd., Alpha House, 10, Carver Street, Sheffield, S1 4FS. Tel: (0742) 753423.

THE MONSTER RATINGS

Introducing the Globs — a family of dedicated software reviewers who will be working day and night to bring you the lowdown on the latest games. Each month software is airlifted to the family seat, Globule Towers, where it is rigorously tested for entertainment value playability and value for money.



The ZX Monster Hit
The ultimate accolade, a surefire hit that's essential for your games collection.



Globella
A special game with addictive features. Miss it and miss out.



Globert
An average game with limited appeal.



Glob Minor
Snooze software — strictly for insomniacs.



Glob Senior
An exasperating game well below the accepted standard.



MUGSY'S REVENGE

Melbourne House
£7.95

Mugsy added cartoon strip quality graphics to the standard strategy, and trading game, and now Mugsy's Revenge continues the idea.

Decisions are taken by replying to questions which are phrased in mock gangstereese. You start with 50,000 dollars and a limited set of options. Once you build up a profit then the options expand, opening nightclubs, hiring 'hostesses', putting contracts on other gangsters etc.

Mind you, other gangsters can put contracts out on you too! When this happens then an arcade sequence comes into play and you have to battle it out with a varying amount of opponents. The Feds may also invite you to a shootout. Although this is well done, I found it annoying as it often happened as I was just making progress and was usually fatal. The Feds even ran me down in a car once, after I'd finally managed to shoot their agents.

As a strategy game there is a reasonable challenge and it can be frustratingly difficult. Unfortunately the built in random element is far too frequently used. Just as you begin to make progress it seems disaster strikes.

At the end of each turn an animated 'highlight' of the year is shown which soon becomes irritating, as does the slowness and frequency of the graphic routines. The original Mugsy game is thrown in free, and this makes it a good bargain if you haven't already got it but if you do then there is not a great deal of point in getting this one.



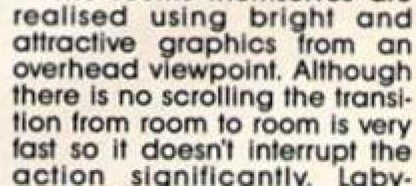
LABYRINTHION

Budgie
£2.99

This is a budget maze game that makes up for a lack of sophistication by being both extensive and very difficult to master. Spread over 256 rooms, the labyrinth contains nine parts of a scroll which must be collected to reveal the way to the exit. The maze is divided into five sectors and your character, a clockwork mouse complete with a huge key inserted in his back, must first pick up four objects (maps, compasses, water bottles and hour glasses) which must be delivered one at a time to that sector's drop point. Only then with the 'sector key' materialise somewhere in the sector. Once that object has been located you are free to wander throughout the maze.

Sounds complicated? Well it is rather, and of course no maze is complete without its resident villains, in this case rats, frogs and others who like nothing better than homing in on you to deplete your energy. Although their effect can be neutralised by collecting certain objects they are a determined bunch of adversaries even on level 1. I dread to think what they get up to when you reach level 5. And bear in mind that you have only got one life to play with at the beginning. You are not entirely defenceless in that weapons are available but in each room there is not a lot of space to manoeuvre in so they can be tricky to deploy.

The rooms themselves are realised using bright and attractive graphics from an overhead viewpoint. Although there is no scrolling the transition from room to room is very fast so it doesn't interrupt the action significantly. Labyrinthion is a tough maze game which at the price represents excellent value.



GAMES

GLADIATOR

Domark
£8.95
Spectrum 128

Forget the enhancements to graphics and sound — where the 128 version of Gladiator scores over the original is that it is much simpler to play.

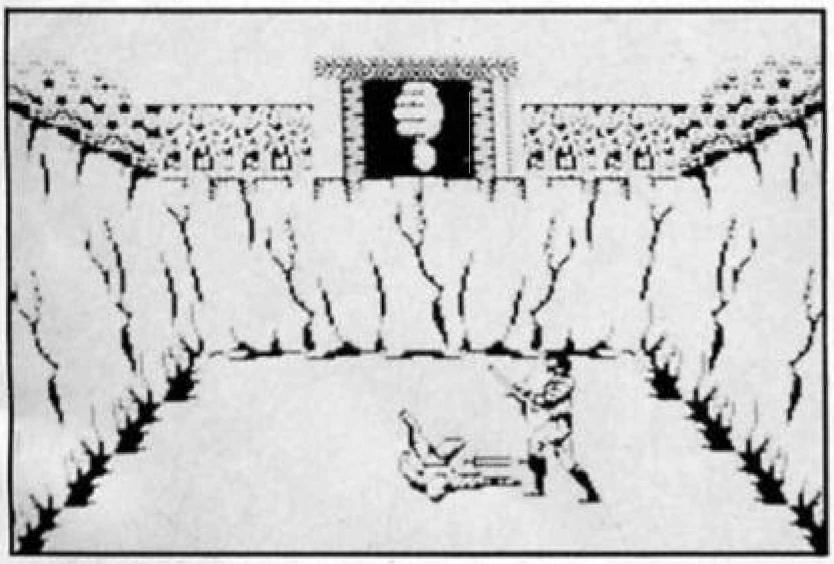
The 48K game boasted 25 different moves, however a third of these required both a shift of a joystick and a double burst on the joystick. If you didn't have the dexterity of a concert pianist your early death in the arena was assured. In the 128 game the moves have been trimmed down to a far more manageable 16 possible moves and the result is a much more satisfying thrust and parry session.

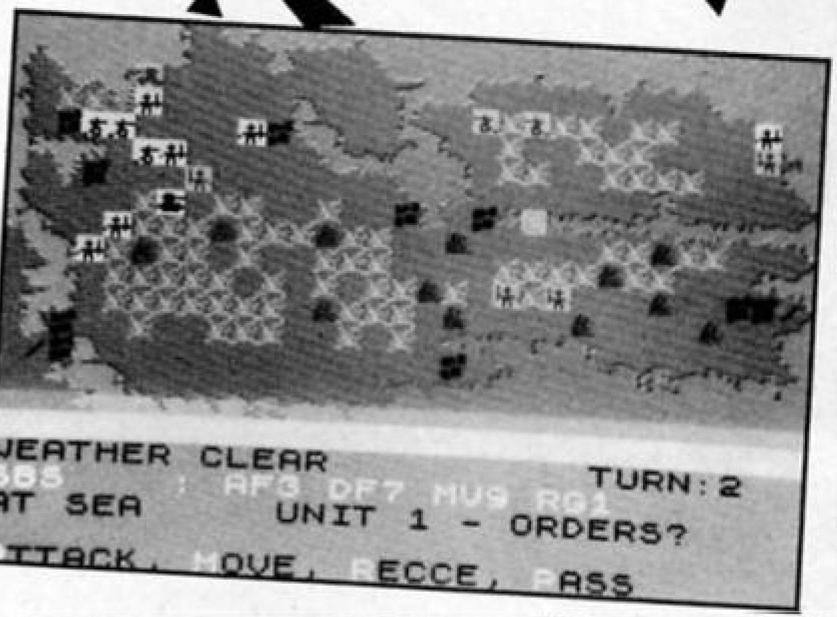
Another improvement is that you are no longer fighting your identical twin brother. In the original every Gladiator was the same, now there are two to choose from.

The aim of the game is to win your freedom and to do this there will be a minimum of 14 fights to win. With each victory you amass more coins but you need 32,400 to become a freeman. Even if you succeed in becoming the Emperor's champion you will still have to gamble your winnings on the outcome of other gladiator's bouts. The gambling element may add an extra element to the game but some may find it a letdown. If you've just risked your three lives in the arena, then risking your shirt as a spectator just doesn't have the same appeal. If you are a better gambler than a fighter and pick up sufficient coins you can buy your certificate of freedom and complete the game.

Overall, Gladiator 128 is a modest advance on the original and the simplified fighting moves may mean that you could make Emperor's champion status far faster.







FALKLANDS '82

PSS
£7.95

The latest in the Wargamer series from PSS centres on the Falklands Campaign, and features a nicely drawn but non-scrolling map of the north eastern area. There's no sign of the defenders until you have done a recce and decided which of four possible landing sites to use — San Carlos is not always the best, that would take all the fun out of it!

Once chosen, all your forces must land, and as you deploy them around the island, the dreaded 'Argies' show themselves, in a similar symbolic form to your own forces. The symbols are rather small, but identifiable; your real knowledge of strengths and weaknesses comes from the displayed code next to each unit's name, showing the balance of aggression and defence factors, which themselves depend on casualties taken and type of terrain occupied. Three differing types of terrain are shown on the map, and each consumes differing amounts of movement points according to difficulty.

At each turn you may select movement, attack or the status quo. If you choose to attack then, weather permitting, you may also call upon air and naval gun support. The weather is often stormy or foggy which reduces your strength in this respect. After each attack however, your position is betrayed, so expect an air strike in the shape of small flickery shapes zooming across the screen. If you're lucky, the Harriers will see them off!

To be fair, I don't suppose hardened wargamers are all that interested in graphical sophistication. This will keep fans of the genre happy for hours — it beat me on the simplest level — and might just be the scenario to attract new, younger users to try a war game.



TURBO ESPRIT

Durell
£8.95

Despite the name, Turbo Esprit is not a game for the speed merchant, instead you are faced with the task of preventing urban drug smugglers from delivering their consignments.

An armoured supply car is transporting the drugs to the city centre where it will be met by four cars that will take the narcotics to secret locations. You have been equipped with a Lotus Turbo Esprit and must round them up.

Even though your car is capable of a simulated speed of 150mph this is no joyride and even in hot pursuit you must stop at pedestrian crossings if someone is on them. Points are knocked off for mowing down innocent pedestrians.

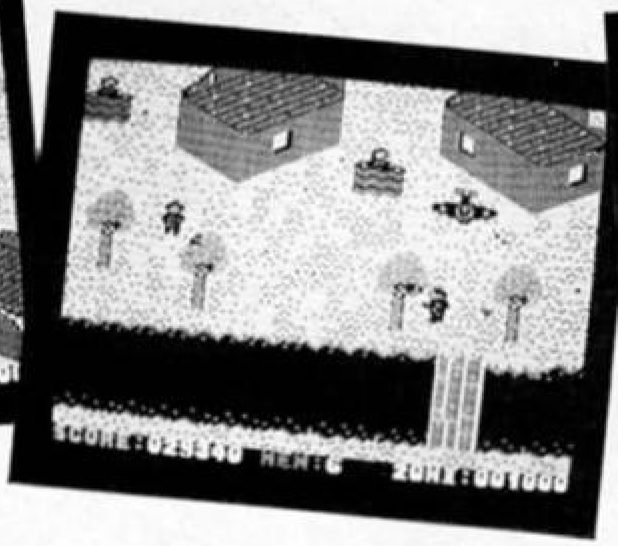
Information on the smugglers' location is given via a map which can be called up at any time and marks your position and that of the smugglers with flashing circles. Messages from HQ also flash up on screen to keep you up to date, such as "Drugs exchanged". Stopping the smugglers can be done in two ways. Firstly shoot at them or secondly 'bump' them which requires a little more subtlety but gets you extra points. Bumping into the smugglers' car at high speeds seems to have a demoralising effect on the occupants and eventually they stop and surrender.

The smugglers of course are not just cruising around waiting to be picked up and they have 'hit cars' which can speed past you at any time and blast you which may mean curtains or a brief visit to the garage if they hit the car. There are four skill levels and you are allocated four cars per game.

Turbo Esprit is best enjoyed using a joystick as the keyboard controls are cumbersome at best. The gameplay is not immediately adictive but does grow on you with time. And the graphics of the urban landscape make a fittingly stark scenario for your mission.









WHO DARES WINS II

Alligata
£7.95

The development of this game was quite a battle. The Commodore version of Who Dares Wins was hit by a crossfire of injunctions from Elite who claimed that the game bore distinct similarities to the arcade game Commando that they were producing under licence. Almost as soon as it appeared Who Dares Wins was withdrawn and in the next breath replaced by the sequel, Who Dares Wins II, with the offending details altered.

Now the conversion has arrived on the Spectrum and the spirit, if not the minute detail, is that of the best selling Commando and Rambo. The mission is to singlehandedly take on an entire army in order to rescue prisoners who have been pencilled in for the firing squad. To save them from being rubbed out you must fight your way through eight fields of battle and capture eight command posts. You are armed with an infinite supply of ammunition for your automatic weapon and five grenades. Additional grenades can be picked up along the way by carving your way through the enemy defences to the spot where the grenades have been air-dropped by parachute.

Five lives are allowed for you to complete your mission and if this seems generous at the start it soon becomes apparent that you need every one of them as you face innumerable battalions, machine gun nests, tanks, snipers and mortar fire. Unless you have a knack for combat games almost every bullet will have your name on it and it will turn into a certain suicide mission.

Freeing prisoners does have its rewards. If you can blast the one man firing squad before he shoots the captive you earn a handsome bonus and a wave from the grateful prisoner, (well what did you expect, a medal?).

When you have successfully made it through all eight sectors you are met with the dismaying message that all the territory you've captured has been grabbed again by the enemy due to your inept back-up forces. So it's back to the beginning again to face even stronger forces. Which just goes to show that if you want something doing to it yourself. This is a frenetic create-your-own-carnage game with enough action to satisfy those who revel in the alone-in-the-war-zone type of game. If you want something with a little more than mayhem and massacre however, you won't find it here.

GOOD



JOCK AND THE TIME RINGS

Atlantis
£1.99



Atlantis aren't a company that you hear a lot about, but they've been producing budget games for a quite a while now and haven't been gobbled up by any of the larger software houses, so presumably they're doing OK.

Jock and the Time Rings, one of their latest releases, is an old fashioned maze game in which you have to collect a number of objects to complete the game. Jock, a robot looking like R2D2 on an off day, has gotten lost in time and the only way he can return to his own time is to collect 32 time rings from each of three time zones. After entering the first zone, the only way to get into the next zones is to find all the objects and gain a password, but the rings are protected by The Guardian of The Rings who turns out to be a collection of deadly sprites patrolling the maze.

Obviously, colliding with any of the Guardian's sprites will cause you to lose a life, but in addition, as Jock enters each section of the maze the ring in that section starts to become unstable, giving off radiation that will kill him if he doesn't collect the ring within the same time limit.

Graphically, the game looks rather old fashioned — the maze is made up of large, chunky bits of brickwork and the size of the bricks means that each section of the maze has to be kept fairly simple. Jock and all the other sprites are large and quite smoothly animated, though none of them move terribly quickly, so this isn't a game that is likely to generate any frantic action. The main problem is working out how to get to all the rings because, though the individual screens appear quite simple, many of the rings seem inaccessible unless you've got a good idea of the layout of the whole zone.

I can't say that this game exactly enthralled me, but for £1.99 it's a reasonable, if rather dated, game.



GRIM



INCREDIBLE SHRINKING FIREMAN

Mastertronic
£1.99

The incredible expanding Mastertronic catalogue has been enlarged further by the Incredible Shrinking fireman and although incredible is not exactly the word that comes to mind to describe the game, it is a passable 'seek-out-the-objects' game.

Shuffling Sid the fearless fireman has had an accident. While fearlessly fighting a fire at a huge shrinking plant he's been reduced to microscopic size after blundering into a shrinking machine. Determined to enlarge himself back to normal size he must seek out a streching rack which is in five parts scattered around the factory.

Objects are strewn around the place, represented by diamond shapes and only by referring to the menu and examing the object can you find out if it's worth picking up. The shrink factory houses objects such as digital watches, a night shade, french onions and an ID card. Only some of these should be held onto but the choice is far from obvious. Sid is an accomplished jumper and some seemingly aimless leaps could propell you though the ceiling to another part of the complex. It's a question of jump and see.

To thwart in your aims are a number of hovering ghouls and ghosts but they don't present too much of a threat to Sid and fail to give the game a challenging edge. The graphics are simple, but adequate for a budget game and Sid himself is a pleasing enough character. Small in scope and small in ambition Incredible Shrinking Fireman certainly won't fire the imagination but if you want a game that will be mildly diverting for an hour or so it will do — at a stretch.



ATTACK OF THE KILLER TOMATOES

Global Software
£7.95

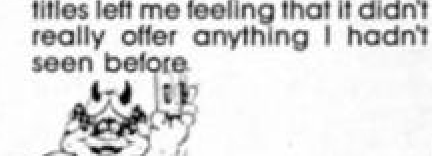
I have the strangest feeling that I've seen this game somewhere before. That's probably because Killer Tomatoes is the latest in the increasingly long line of Knight Lore clones. Knight Lore's 3D graphics were something special when that game was first released, but over the last six months or so there have been more and more games all built around that once unique style of graphics, and the novelty's starting to wear off.

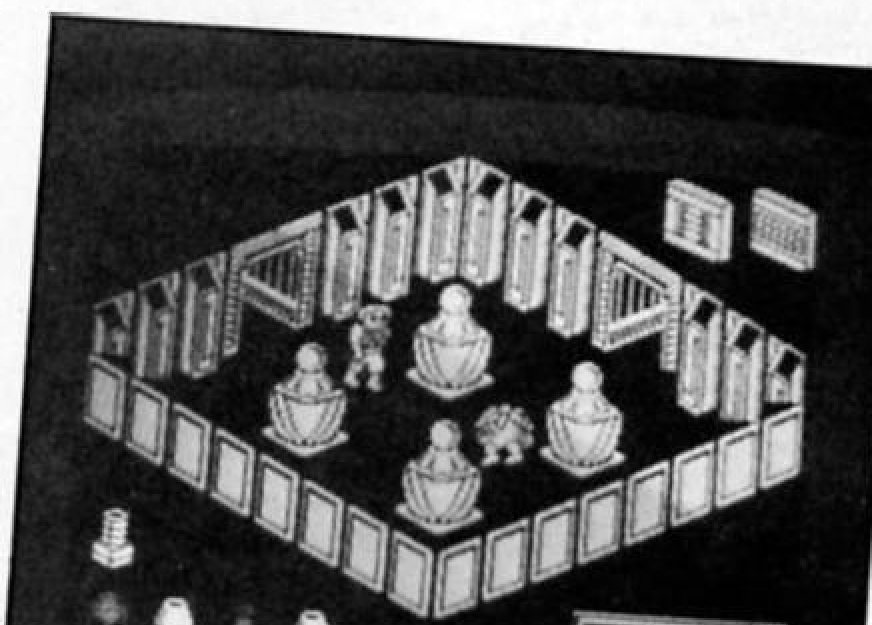
Killer Tomatoes casts you in the role of Wimp Plasbott, proprietor of a pizza restaurant that's in danger of closing down through lack of tomato sauce. So Wimp sets off to tackle the killer tomatoes and stock up on sauce before time runs out on him.

The factory that Wimp has to make his way through is full of the now familiar sorts of obstacles, though in this case most of the deadly objects are tomatoes of one sort of another. There are the bouncing tomatoes that have to be collected and carted off to the machine that turns them into sauce, and the tomatoes on legs that have to be subdued by finding the hammer hidden in the factory somewhere. Also scattered throughout the factory are a number of objects that can be carried and used to help you get through some of the rooms, though it seemed to me that some of the traps are impossible to get out of unless you've got just the right things with you.

The time limit is controlled by a clock which counts down as the game progresses. Wimp starts at 9.30 in the morning and has until 5.30 in the afternoon to complete his task. The clock counts down in real time, though there are time penalties of ten minutes whenever you hit some of the tomatoes.

Killer Tomatoes is quite a complex, and very professionally produced game, that should keep you occupied for quite a while, but its similarity to all the other Knight Lore inspired titles left me feeling that it didn't really offer anything I hadn't seen before.





PING PONG

Imagine
£7.95

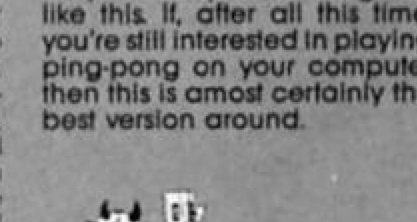
Sometime last year Imagine signed a deal with Konami to convert loads of their arcade games onto home micros, and the latest is their Ping Pong game. It's odd really, that Ping Pong which was one of the first video games is still being produced, but Imagine's version is considerably more sophisticated than the old two-dimensional games with a white blob bouncing from left to right.

As soon as the game loads it starts to play a tune that's very impressive considering the limits of the 48K machine's sound facilities, and throughout the game sound is well used.

Once play begins you are presented with a slightly overhead perspective on the table, and in the background on either side of the screen are two extremely partisan crowds who cheer whenever their chosen player scores a point. The standard rules of table tennis are observed, the winner of each game being the one who reaches eleven points first, though you must also win by at least two points and if the score reaches fifteen all the game is abandoned (though when I played that didn't present any problems since the computer always won by eleven points).

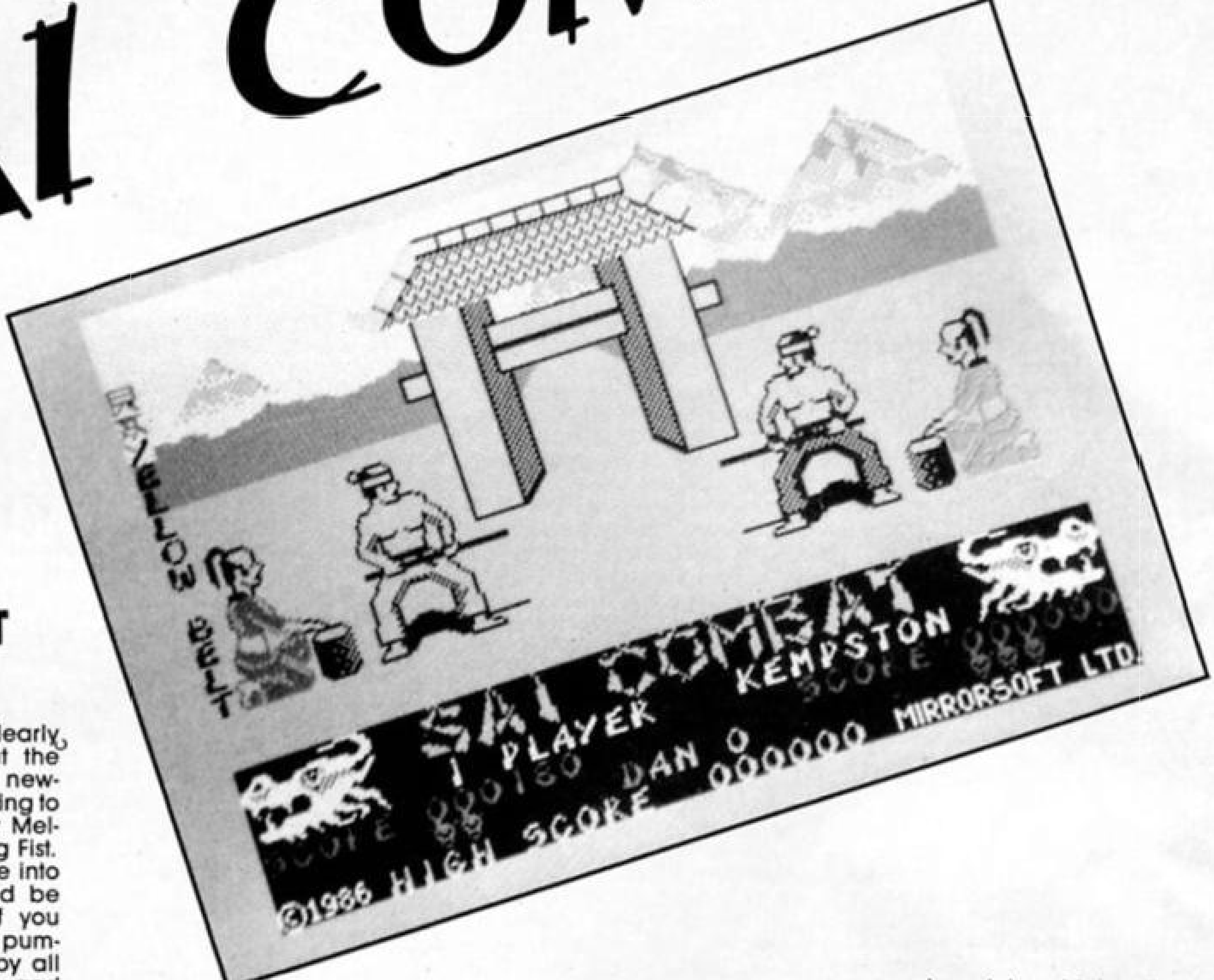
The controls are fairly simple; The two basic strokes available to you are the cut and drive, the first being a slow shot, while the second is faster and I generally managed to knock that one out of play. There is also a smash shot available, and the serve obviously, and there are backhanded variations on these shots which I found allowed me to knock the ball out of play in several different directions. Your timing has a lot to do with controlling the direction of shots and the speed of play increases on each of the five levels, so though the controls aren't that complex the game isn't easily mastered.

The graphics aren't exactly spectacular, but they are clear and uncluttered which is probably more important in a game like this. If, after all this time, you're still interested in playing ping-pong on your computer then this is amost certainly the best version around.



A rival to Exploding Fist? Mirrorsoft enter the world of karate but is it just another chop off the old block?

SAI COMBAT



SAI COMBAT

Mirrorsoft
£6.95

Martial arts games are clearly one of the in things at the moment, though any newcomers in this field are going to have to do well to beat Melbourne House's Exploding Fist.

Still, Mirrorsoft's venture into the kung-fu arena could be well worth trying out if you haven't already been pummelled into submission by all the other samurai, ninjas, and leaping lunatics currently on the loose.

For those of you interested in the inscrutable details, Sai karate is an ancient oriental martial art which originated in Okinawa. The purpose of Sai is to allow practitioners to achieve high levels of consciousness by giving their honourable opponents a transcendental poke in the head with a big stick.

One or two players can play, and if you choose to play against the computer you are faced with a series of opponents of increasing skill whom you must defeat in order to progress through the eight belts and reach black belt. Once you've gotten your black belt you are then faced with the further task of going through eight dan levels to achieve the ultimate status of Sai Master.

The basic format of the game is very similar to that of Exploding Fist, in which you play a series of combat bouts and your success in these determines whether or not you can progress to the next skill level. In Sai Combat you need to score three knockdowns to do this, each knockdown requiring at least 600 points. Landing a successful blow on your opponent is worth one, two or three hundred points, depending on what sort of blow it is.

The options available to you fall into roughly three types; there are various kicks, jabs with the Sai stick, and non-offensive moves which allow you to position yourself for that one knockout blow, or alternatively, to run away.

You have a total of sixteen moves available, which is slightly fewer than in Exploding Fist though I didn't find this a weakness at all, since I always have trouble trying to remember the millions of key combinations. In fact, the clear difference between the kicks and Sai movements helped make it a bit easier to remember what all the moves were, whereas in Exploding Fist I found many of the movements so similar that I couldn't always remember what they were.

Your figure is controlled by eight basic keys or movements of the joystick, and a further eight movements are obtained by the use of the fire button. Thankfully it looks as if some thought has gone into the choice of keyboard controls and it only took me a few moments to get the hang of the basic controls.

As with most games of this sort, the action takes place against a series of countryside landscapes. These scenes aren't as finely detailed as they are in some similar games, but let's face it, it's the mayhem in the foreground that we're all interested in isn't it? The two warriors (yours being in the lighter shaded pyjama bottoms) are both finely drawn and smoothly animated during the execution of their movements.

The twirling of the Sai sticks during some moves is particularly well done (though the flying kicks look a bit cissy), and each successful blow is accompanied by a suitably gritty sound effect and a small visual effect to highlight the impact of the blow.

One thing that I found a little irritating about Exploding Fist was the shortness of the rounds, but here the rounds can last for as long as it takes to build up enough points, which allows you to work up a bit of steam and string together a few satisfying blows.

If Sai Combat had arrived on the scene a little earlier it would have been good competition for Exploding Fist. Arriving this late in the day there is a slight risk that it could be lost among all the other fighting games, but it's still one of the better ones despite this.



GREAT

SPECTRUM PREVIEW

THE WAY OF THE TIGER



Gremlin Graphics' everyday story of Ninja life promises a procession of devious and devastating opponents to practice your combat skills on.

Divided into three sections, The Way of the Tiger pits your warrior, Avenger, against an array of deadly attackers. Other Ninja warriors are the least of your problems.

Part one gives you the chance to sharpen up your hand to hand combat expertise. Set in an impressively detailed landscape, complete with animated fountain and swaying plants, you are confronted with a hovering ghost who materialises out of thin air to try and smother you, a jumping dwarf and a Rhino-man who seems to have had a nose job to make him look even uglier. There's also a rival Ninja who leaps from behind a rock to give you a token human opponent.

When you have defeated all comers you are transported to guard a bridge over a mysterious lake. You are armed with your Ninja pole and must prevent your trainer's henchmen from consigning you to a watery grave.

They are a very strange bunch indeed, ranging from a rattling skeleton still wearing the tattered remnants of his earthly clothes and a bald goblin who appears to be armed with a lethal frying pan. Again with this scene the graphics and background detail are excellent. This time we are treated to jumping fish and ducks that take off from the lake.

Finally, having brained the assorted usurpers which again include another Ninja (or is he the same one revitalised from the first section), you have won the chance to face the ultimate test.

Outside the grand temple of Martial Arts you must defeat Naijishi the Grand Master in a duel with samurai swords. But before that the other Ninja crops up again to try a last ditch effort to rob you of a crack at the Master.

As you are locked in a fight to the death with Naijishi, peasants in the background stroll across carrying oriental sedan chairs or pushing weighty wheelbarrows. They pause for a moment, wipe the sweat from their brow and carry on oblivious to the mortal combat.

The Way of the Tiger is full of such neat touches and it takes a step beyond the standard fight games. The figures are also realised with an acute eye for detail and being both large and smoothly animated look set to give the combat game fanatic a real challenge.

This early look at The Way of the Tiger bodes well for the finished version which will be available for £9.95.





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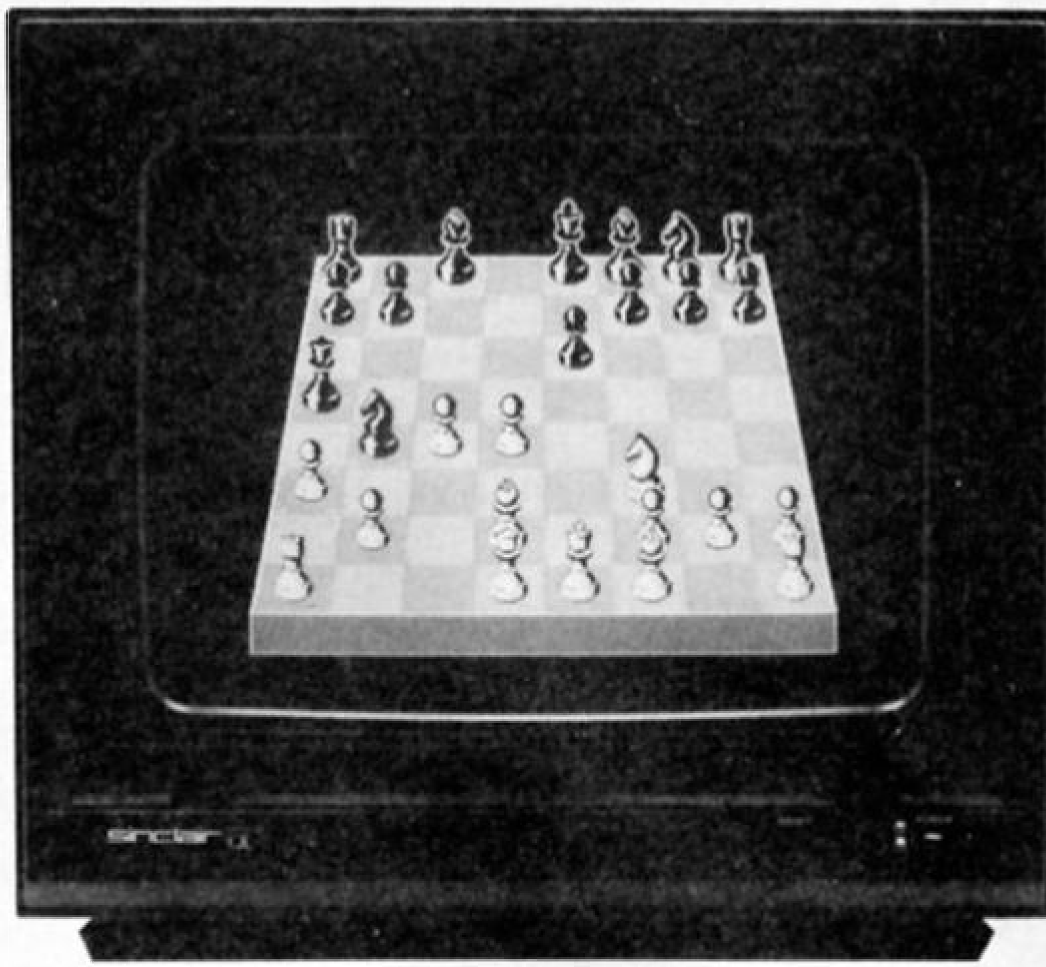
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Brian Beckett assesses the leading chess programs currently available for the Spectrum and QL.



QL Chess.

CHECKMATE

The late Norbert Wiener, founder of cybernetics, predicted a day when playing chess would be about as intellectually stimulating as a game of noughts and crosses. Both are zero-sum games of perfect information and (if neither side makes a mistake) ideal play will end in a draw.

The reason noughts and crosses is boring and chess is still seen as a great mental challenge is simply that even the ablest grandmaster is incapable of sorting through the seemingly endless possibilities opened up in any one game.

Computers, however, might some day be capable of playing error-free chess and Wiener foresaw fallible human opponents' interest in the game declining as a result.

Wiener, who worked in the pioneering days of mainframe computers did not however imagine the speed with which chess playing micros would become commonplace.

The capabilities of your piece of Sinclair gadgetry would have cost a small fortune only a few years ago but (if you are a chess player) it fortunately still falls far short of Wiener's super intelligent beast.

But, if you don't happen to be a budding grandmaster, a game against your QL or Spectrum can still be pretty damaging to the ego. Sir Clive's little black boxes play passingly good games at even the lower skill levels and can mimic a logical intelligence quite capable of beating an unwary master at the higher one. It's worth having a look at some of the better Sinclair chess programs available both as a guide to buying one and — by highlighting some of their weaker lines of play — avert Wiener's nightmare of the faultless chess computer.

Someone is bound to bring out a chess program for the 128K Spectrum pretty soon but all we have now is several packages for the 48K Spectrum and one for the QL. It's not a case of finding the "best" program — the Spectrum packages share similar features, comparative prices and roughly the same skills while Psion's QL chess has the advantage of being both an excellent product and the only one available — but rather a case of choosing the one or more that you happen to like more than the others.

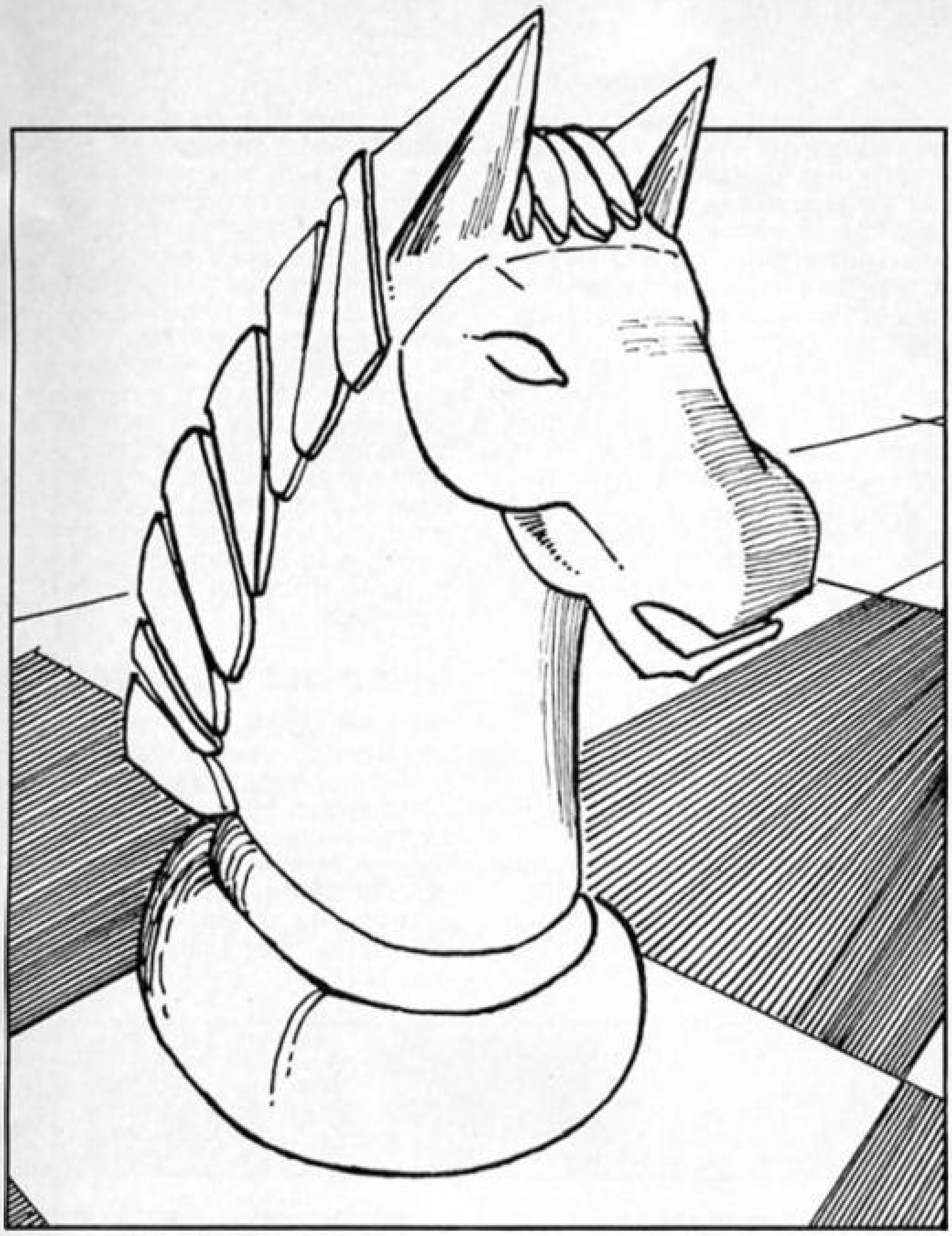
Challenge

Assuming that you're buying a chess program to play it yourself, you want one that offers you a challenge as well as being able to defeat your neighbour's computer. QL Chess, for example, came first in a microcomputer knockout championship which included some dedicated chess computers but, against certain Queen's Gambit play, is marginally easier to beat than Psion's Spectrum program.

The programs looked at here are QL Chess (marketed by Sinclair at £19.95 and developed by Psion) and the three leading packages for the 48K Spectrum: Sinclair's Masterchess (again written by Psion), Artic Computing's Spechess II and OCP's Chess: The Turk. For the historically curious, The Turk takes its name from an eighteenth century, chess-playing automaton dressed in Turkish costume that was the wonder of Europe and — as many believe — probably contained a legless Russian soldier who selected the plays and moved the gears. The Turk costs a reasonable £5.95 making it the cheapest of the Spectrum programs but a watchful eye can usually get the other two at a bargain. The Sinclair/Psion program, for example, is often found in specially priced game packs and many Spectrum owners probably already have one.

All chess programs have several levels of play that are a function of the amount of time that the computer is allowed to consider its move. They range from a few seconds at the lower levels to several hours at the higher ones. For a skilled chess player, this can be a problem as the lower levels don't offer a challenge and the higher ones can take forever. Here QL Chess wins hands down as its top "tournament" level (Number 11) occupies the computer for an average of only four minutes a move. If you want, you can set the QL to match your average move time or (if you have a great deal of time on your hands) play at infinite time where the computer will consider its move until you force it to play with a keyboard command.

QL Chess has the additional feature of considering its possibilities while waiting for you to move. Shutting off this feature with the "Easy" command in effect doubles the number of levels. For the Spectrum, Artic's program is probably the best for



selecting a level of play — you simply type in the move-time you want. This makes level selection a continuous function of time rather than a choice of quantum leaps which might not match what you want. The Turk is the worst in this respect as it increases the Spectrum's move time from 90 seconds at Level-3 to 10 minutes at Level-4 and one hour at Level-5. The jump from 90 to 600 seconds is a bit too large as it's in this sort of time range that a player of medium skill finds himself with a challenge. The Turk, however, will often move in far less time than the maximum allowed at say Level-4.

Making moves

As far as graphics go, there is little real difference between the Spectrum programs: the screen shows a top view of the board with the pieces in profile. Personally speaking, Spechess is marginally poorer and The Turk a bit better. The Turk has the added clever feature of toppling over the King upon checkmate or, if you quit the game, your King upon what it always and cheerfully considers your resignation. QL Chess offers a choice of the traditional image or a superb 3D view that is a credit to the programmer's skill.

The pieces are moved with a cursor in QL Chess but, in the Spectrum programs, you type in moves using an algebraic notation that replaces the traditional chess codings. Unlike the others, the Psion program does not require you to ENTER your move — the computer does it automatically when you type the last code number — which is nice for speed but unfortunate if you make a mistake.

All the programs allow you to quit and start another game (only The Turk gloats about it) and QL Chess enables the player to change sides at any time. I suppose there is a reason for this feature but its only obvious purpose would seem to be a consolation prize to poor players. If you can't win any other way, you can always allow the QL to push you to the brink of defeat and then switch colours at the last minute. The Turk and QL Chess allow you to take moves back and, while this is handy if you make a silly mistake, it also encourages sloppy chess thinking.

All the programs allow you to play from a pre-set position after placing the pieces as you wish. They all use the cursor to set-up the pieces except for Spechess where the piece, colour and square are typed in. The QL cursor is quite easy to use but the others can be a bit cumbersome which is why I prefer Artic's method for the Spectrum. Levels of skill can be selected for set-up as well as normal play in each program and QL Chess has the additional feature of eight problem solving levels. As with traditional problems, the idea is to ask the QL to find a mate in say five moves.

Each program will recommend a move to the player if asked. This is a useful feature for beginners or those who wish to examine the computer's chess reasoning in some detail. Otherwise if you have to ask the computer for its opinion on your best move, you're playing at too high a level. After all, the object of the exercise is to win and not to do what you're electronic opposition thinks you ought to do.

Countdown

All the programs allow you to save the game to tape or to a printer. The Turk has an option for playing blitz chess which is a nice feature. The on-screen clock starts counting down from five minutes and the first side to run out of time loses if (as is likely) no checkmate has occurred. On-screen chess clocks are standard save with Spechess. QL Chess has the very useful feature of declaring a stalemate if a sequence of moves is repeated for three consecutive plays. Otherwise it's pretty much up to you to declare a draw by perpetual check or repeated moves — against any of the programs — by simply quitting the game. All the programs recognise checkmate immediately except for Spechess which, when it's defeated, uses up most of its allotted time before declaring your victory. While there is absolutely no harm in this, I personally find it a bit annoying.

Both The Turk and QL Chess have demonstration modes where the computer will play itself, replay options where the computer re-displays a game on screen move by move and the capability to "referee" a game between two players. In the latter mode, the computer simply asks for move inputs from both sides, displays the moves on the screen after ENTER and keeps track of the times. Of the Spectrum programs, The Turk has the largest reservoir of extra features while the Psion package has been honed down to the bare essentials but it does play a good, aggressive game.

Next month I'll be setting some classic chess problems for your Spectrums and QL's and showing how even the best chess software is vulnerable to the shrewd sacrifice.

Different systems are available for different reasons, Teletext systems are used for 'non-intelligent' users who require quick, cheap information and know exactly where to get it. It cannot be used to search for information as this is indexed by page number only. Prestel uses it because the pages are only 1K long and many thousands of pages can be stored with a quick transfer time (all Viewdata systems are standardised on 1200 Baud receive and 75 Baud transmit). This means that you must work out what pages you require before you go on line otherwise you can spend a lot of time going through unnecessary pages. Some Sinclair and BBC Bulletin boards are run on this type of system as it only requires discs or, in the case of the Spectrum, microdrives to store the pages. Computer users are catered for by providing mailboxes which are free to any other system user. Anyone can hire pages on Prestel at a very cheap rate and there is a standard way to download

ON-LINE SYSTEMS

programs from the system. Each page is charged when you enter it and the cost added to your bill, so there's no way to avoid it. If you are selling software this would count as a credit and be deducted from your bill.

Without special facilities it is difficult to upload information on to Prestel quickly, and 75 baud is a very low speed for the computer to transfer information. Prestel software is also different to other database software, so make sure you get the right type of software for your computer.

Prestel is available internationally and only costs £5 a quarter, plus the time you spend on the call which in the UK is usually a local one.

300 Baud systems

These systems use a standard ASCII code (as used inside the Spectrum) usually protected by a password on entry system and sometimes more passwords for deeper levels in the system. They are usually fairly user-friendly and give help in most places. They are not that fast, but provide 300 baud speed for the user to send which is four times as fast as a Prestel system. Unlike Prestel, access to these systems is usually restricted to one or two entry points, or more if they are connected to the PSS (Packet Switch Stream) data exchanges run by British Telecom. They do however, allow for intelligent as well as 'dumb' terminals like a Prestel one. The information is not paged, but run on a scrolling screen so that when the writing comes to the last line it moves up the whole screen losing the top line and making a blank line at the bottom to write on. This way any length of text can be transferred to the user and it can be searched for keywords so that selective storage can be done. Systems usually recognise the XON/XOFF protocol (code system) which allows the user or the computer to halt and restart the flow of data from either end.

The request for information can also be preprogrammed and can, if you're not in a hurry, be timed, so that it can be made at cheap rate (usually when you're in bed).

This system only uses black and white, no colours, as computers cannot agree on the colour codes, this also applies to the automatic transfer of programs as only Bulletin Boards seem to agree that codes above the normal printable character set can be used. They use a system called XMODEM protocol which sends the data in blocks included inside a packet. The packet is made up of a header, a fixed length of data and a checksum to tell if there was an error while it was being sent If an error has been received the computer is asked to send the block again until an error-free one is obtained.

The data can be anything you want, and this way Spectrum programs and code could be stored on a school's BBC discs, if both have an XMODEM program. In this way Bulletin Boards can store programs suitable for different computers without having different software for each. The program can be any length as long as both computers have sufficient capacity to store the program. ASCII listings are no good to the Sinclair user anyway as they have to be retyped into the computer, which rather defeats the object of downloading software in the first place.

Unfortunately, XMODEM programs have to be bought on tape as they cannot be downloaded without an XMODEM-type program!

Higher speed systems

Some databases and commercial Bureaus use half-duplex transmission to send at a higher rate. This means that information can travel in only one direction at a time and some means of changing the direction of sending must be used. At present there are many different ways of doing this, so it depends on what system you want to access. But the advantage is that clear blocks of data can be sent in a similar way to XMODEM, but at a rate of up to 2400 Baud! One thing about these systems is that you have to provide an 'echo' of what you typed, whereas on Prestel and Bulletin Boards it is 'echoed back' by the distant computer.

Trying out the systems

The best way is to try the systems you want to access first. Most Bulletin Boards are free, although some require a charge for the regular user. Other Bulletin Boards can usually be obtained from a list on the first one you try, so you can save your telephone bills by finding one locally.

PRESTEL visitors can use an ID of 4444444444 (ten fours) and a password of 4444 to look round the system without charge. There is even a Micronet tour to show you what is available on page *800, but some pages are reserved as 'private.' Commercial systems usually have to be paid for before you are allowed access or may require a password, though some viewdata systems will allow you a brief look round. Private viewdata systems such as "GNOME AT HOME" allow free access as well, but as it is expensive to run these systems they would usually like some contribution from the user.

Well, that's the end of the round up of available systems, now here are a few numbers to try.

PRESTEL (London only) 618. Outside of London dial 01-686-0311 for PRESTEL London, then look up on the system how to access your local Prestel.
01-679-6183 24 HOURS DISTEL (commercial).
01-648-0018 24 HOURS MITCHAM (1200/75 and 300 Baud Bulletin Board).
01-941-4285 METROTEL (commervial viewdata).
01-888-8894 GNOME AT HOME (viewdata Bulletin Board).

FRED MULLINS

Quill Quest

There are ten complete adventure writing kits from Gilsoft to be won!

Once upon a time, the wise old programmers at Gilsoft produced a utility called The Quill — a wondrous device that allowed mere mortals who knew nothing at all about machine code to write their own text adventure games. And there was much rejoicing in the land, and an abundance of budget adventure games too.

But the great software houses decided that graphic adventures were the next big thing, which left poor Quill owners up the tree without a parachute until Gilsoft once more came to the rescue with The Illustrator, a second utility that allowed you to add full-screen graphics to Quilled games. Until recently you would have had to buy both The Quill and The Illustrator separately, but now Gilsoft have released a double pack of the two programs and will give ten of them to adventurous ZX readers in this competition. In addition, Gilsoft will also throw in a copy of their other program, The Patch, with each prize. The Patch allows you to produce less than full-screen sized pictures with The Illustrator which can be combined to produce text and graphic display in your Quilled adventures. So, in other words we're offering you the chance to win a complete graphic adventure writing kit (worth just under £30), and all you have to do to enter this competition is stretch your imagination a bit.





What we'd like you to do is to think up an idea for your own adventure, perhaps one that you'd write if you won one of these prizes. The tricky bit is that you've got to encapsulate your flight of imagination in just thirty words (or less, if you think you can do it). Then just write down your idea and send it to us, along with your name and address to: Quill Competition, ZX Computing, 1 Golden Square, London W1R 3AB.

The closing date for the competition is 6th June 1986. The winners will be chosen by The Editor, who tells me with a masterful glare that his decision is final.

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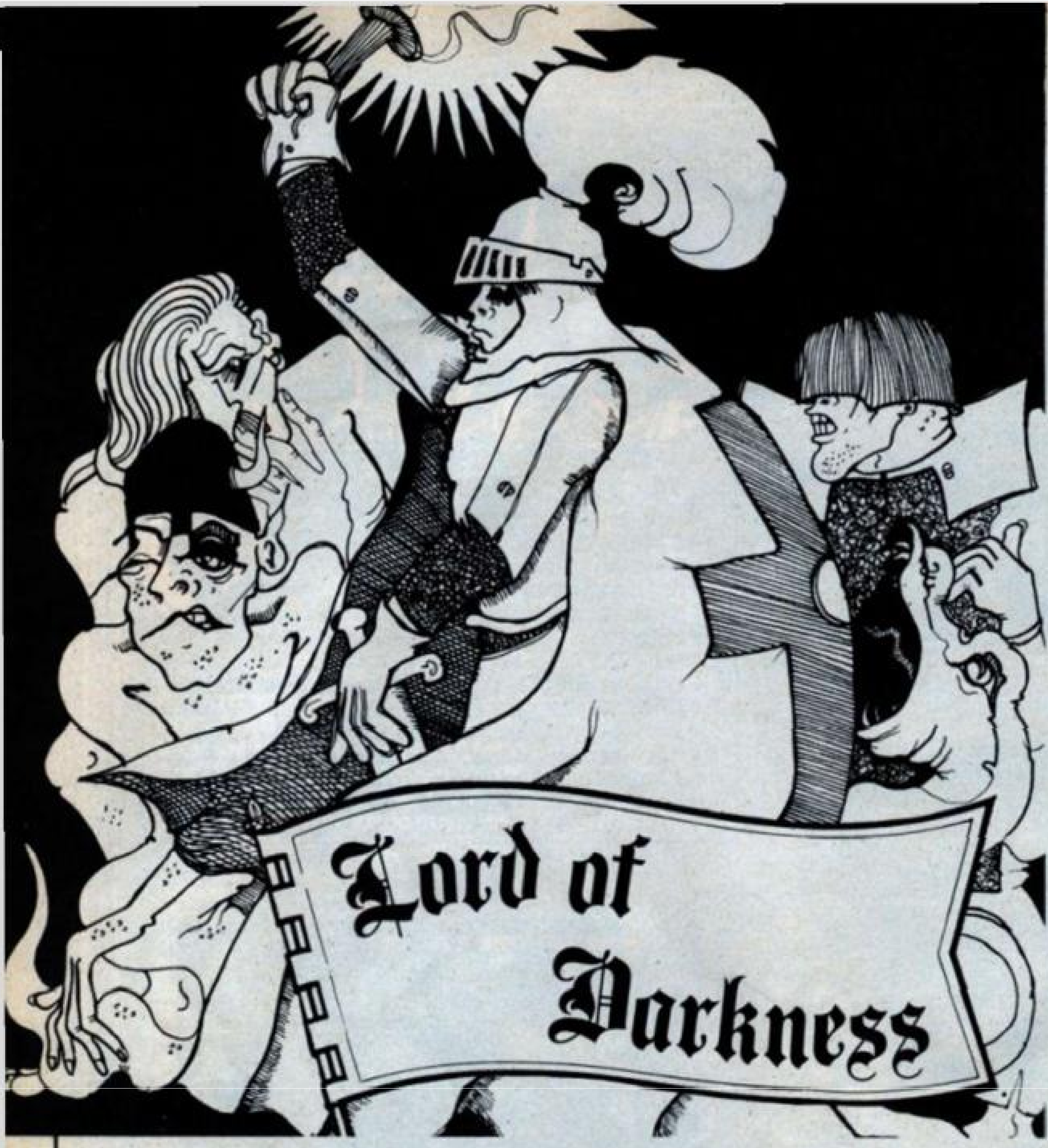
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NOW A NEW DISCOVERY FOR THE 128K SPECTRUM – CALL 0737 65080 FOR DETAILS



Lord of Darkness

D.I.Y.

By Philip Dutre

Prepare to combat the dark forces! Philip Dutre has written us a 3D graphics adventure that combines animated graphics, menu driven controls and traditional text input — all this in a quest to seek out and destroy the Lord of Darkness before he gains control of Middle Earth. It's a long program, but definitely worth the effort to type it in.

Listing 1

This is the master Loader program which will load the parts of the finished game. Enter it and save it onto your game tape with the command; **SAVE "Lord" LINE 10.**

Listing 2

Type **NEW,** then enter this listing which contains the data for the new character set. **RUN** it, and when prompted **SAVE** the code onto your game tape. It's a good idea to make a separate copy of this program just in case you make a mistake in the data statements.

Listing 3

Type **NEW** again, and enter this program. This contains data for 126 UDGs! **RUN** it, and save the code onto your game tape. You should also make a separate copy of this one too.

Listing 4

NEW the Spectrum one more time, buy some sandwiches, and get ready to enter this listing. Don't **RUN** it, but **SAVE** it onto your game tape with; **SAVE "Lord" LINE 1**

PROGRAM 1

```
  10 PAPER 0: BORDER 0: INK 0: C
LS
  15 CLEAR 63455
  30 PRINT AT 13,0;: LOAD ""CODE
63592
  40 PRINT AT 13,0;: LOAD ""CODE
64360
  50 PRINT AT 13,0;: LOAD ""
```

PROGRAM 2

```
   5 CLEAR 63999
   6 RESTORE 250
   7 PRINT AT 10,5; PAPER 4;"PLE
ASE WAIT A MOMENT": BEEP .01,10
  10 FOR n=15616 TO 16383: POKE
64000-15616+n,PEEK n: NEXT n
 200 LET sum=0: FOR n=64000 TO 6
4015: READ a: LET sum=sum+a: POK
E n,a: NEXT n
 210 IF sum<>96 THEN  PRINT "ERR
OR IN LINE 250": BEEP .1,20: STO
P
 250 DATA 16,16,16,16,16,0,16,0
 260 LET sum=0: FOR n=64128 TO 6
4207: READ a: LET sum=sum+a: POK
E n,a: NEXT n
 265 IF sum<>3164 THEN  PRINT "E
RROR IN LINES 300-390": BEEP .01
,20: STOP
 299 REM numbers
 300 DATA 24,36,70,74,82,36,24,0
 310 DATA 32,16,16,16,16,16,8,0
 320 DATA 60,66,2,12,16,32,126,0
 330 DATA 60,66,2,12,2,66,60,0
 340 DATA 8,24,40,72,124,8,8,0
 350 DATA 62,64,92,34,2,66,60,0
 360 DATA 6,24,32,124,66,66,60,0
 370 DATA 126,2,4,8,16,32,64,0
 380 DATA 60,66,66,60,66,66,60,0
 390 DATA 60,66,66,62,4,24,96,0
 400 LET sum=0: FOR n=64248 TO 6
4255: READ a: LET sum=sum+a: POK
E n,a: NEXT n
 410 IF sum<>148 THEN  PRINT "ER
ROR IN LINE 450": BEEP .1,20: ST
OP
 450 DATA 60,66,2,4,8,0,8,0
 460 LET sum=0: FOR n=64264 TO 6
4471: READ a: LET sum=sum+a: POK
E n,a: NEXT n
 470 IF sum<>10600 THEN  PRINT "
ERROR IN LINES 500-750": BEEP .1
,20: STOP
 499 REM upper case
 500 DATA 30,34,66,126,66,66,66,
0
```

```
510 DATA 92,98,66,92,66,66,124,
0
520 DATA 28,34,64,64,64,34,28,0
530 DATA 92,98,66,66,66,68,88,0
540 DATA 94,96,64,112,64,64,126
,0
550 DATA 94,96,64,112,64,64,64,
0
560 DATA 28,34,64,64,70,34,30,0
570 DATA 66,66,66,126,66,66,66,
0
580 DATA 56,16,16,16,16,16,56,0
590 DATA 56,8,8,8,8,72,48,0
600 DATA 68,72,80,112,72,68,66,
0
610 DATA 64,64,64,64,64,66,124,
0
620 DATA 66,102,90,66,66,66,66,
0
630 DATA 66,98,82,74,70,66,66,0
640 DATA 24,36,66,66,66,36,24,0
650 DATA 92,98,66,92,64,64,64,0
660 DATA 24,36,66,66,66,36,26,0
670 DATA 92,98,66,92,72,68,66,0
680 DATA 60,66,64,60,2,66,60,0
690 DATA 124,16,16,16,16,16,16,
0
700 DATA 114,34,66,66,66,70,58,
0
710 DATA 66,66,34,34,18,20,8,0
720 DATA 119,34,65,65,73,73,54,
0
730 DATA 65,34,20,8,20,34,65,0
740 DATA 65,34,20,8,8,8,8,0
750 DATA 63,66,4,8,16,33,126,0
800 LET sum=0: FOR n=64520 TO 6
4727: READ a: LET sum=sum+a: POK
E n,a: NEXT n
810 IF sum<>8352 THEN  PRINT "E
RROR IN LINES 1000 1250": BEEP .
1,20: STOP
999 REM lower case
1000 DATA 0,0,52,76,68,68,54,0
1010 DATA 64,64,88,100,68,68,88,
0
1020 DATA 0,0,56,68,64,68,56,0
1030 DATA 32,16,24,36,68,68,56,0
1040 DATA 0,0,56,68,124,64,60,0
1050 DATA 24,36,32,56,32,32,32,0
1060 DATA 0,0,56,68,64,76,60,4
1070 DATA 64,64,88,100,68,72,92,
0
1080 DATA 8,0,24,8,8,8,28,0
1090 DATA 8,0,24,8,8,8,48,16
1100 DATA 64,64,72,80,112,72,68,
0
1110 DATA 32,32,32,32,32,36,24,0
1120 DATA 0,0,86,105,73,66,71,0
1130 DATA 0,0,88,100,68,72,92,0
1140 DATA 0,0,60,66,66,66,60,0
1150 DATA 0,0,88,100,68,68,88,64
1160 DATA 0,0,52,76,68,68,52,4
1170 DATA 0,0,88,100,68,120,68,0
1180 DATA 0,0,56,64,56,4,120,0
1190 DATA 16,16,120,32,32,36,24,
0
1200 DATA 0,0,116,36,68,76,52,0
1210 DATA 0,0,68,36,20,20,8,0
1220 DATA 0,0,119,34,73,73,54,0
1230 DATA 0,0,68,40,16,40,68,0
1240 DATA 0,0,66,34,18,12,72,48
1250 DATA 0,0,30,36,8,18,60,0
1300 POKE 23606,0: POKE 23607,24
9
1310 CLS : PRINT AT 5,0;"You can
 always restore the        origina
l characterset by          doing t
he following commands:
                           POKE 23
606,0    POKE 23607,60    "
1320 PRINT AT 15,0;"This new cha
racterset is stored in bytes 640
00 to 64767 ,making 768 bytes.

                    This block w
ill now be saved."
1330 SAVE "CHARSET"CODE 64000,76
8
1340 STOP
```

PROGRAM 3

```
5 REM **User Defined Graphics
10 CLEAR 64300
20 RESTORE 9000
30 PRINT AT 10,0; PAPER 4;"Ple
ase wait a moment"
40 GO SUB 9000
50 CLS : PRINT "The user defin
ed graphics are   stored in byte
s  64360 to 65535"
51 PRINT ''"This block is 1176
bytes long   and will now be sav
ed."
60 SAVE "udg"CODE 64360,1176
100 STOP
9000 LET sum=0: FOR n=64360 TO 6
4527: READ a: LET sum=sum+a: POK
E n,a: NEXT n
9005 IF sum<>10413 THEN  PRINT "
ERROR IN LINES 9010 9030": BEEP
.1,20: STOP
9010 DATA 0,124,254,250,254,255,
28,15
9011 DATA 0,62,127,95,127,255,56
,240
9012 DATA 0,0,0,66,255,66,0,0
9013 DATA 4,17,73,72,2,146,103,2
55
9014 DATA 0,72,41,41,98,106,202,
255
9015 DATA 0,1,2,4,8,16,33,64
9016 DATA 0,254,6,58,26,42,202,1
94
9017 DATA 255,129,129,129,129,12
9,255,0
9018 DATA 68,72,16,32,64,128,0,0
9019 DATA 96,80,72,80,96,64,64,0
9020 DATA 2,2,6,10,18,38,74,0
9021 DATA 8,10,10,28,40,40,8,0
9022 DATA 68,68,100,84,76,68,68,
0
9023 DATA 96,80,72,80,96,80,72,0
9024 DATA 8,8,8,8,28,42,8,0
9025 DATA 16,80,80,56,20,20,16,0
9026 DATA 68,100,84,76,100,84,76
,0
9027 DATA 84,84,100,104,112,64,6
4,0
9028 DATA 4,8,16,32,16,8,4,0
9029 DATA 12,20,36,68,4,4,4,0
9030 DATA 12,20,36,28,36,20,12,0
9510 LET sum=0: FOR n=64528 TO 6
4695: READ a: LET sum=sum+a: POK
E n,a: NEXT n
9515 IF sum<>19603 THEN  PRINT "
ERROR IN LINE 9520 9550": BEEP .
1,20: STOP
9520 DATA 31,35,65,81,89,35,30,1
2
9521 DATA 248,252,254,254,252,24
8,0,0
9522 DATA 8,7,1,12,15,15,15,15
9523 DATA 240,240,192,208,240,24
0,240,240
9524 DATA 15,15,15,15,13,3,15,15
9525 DATA 240,240,192,240,240,22
4,208,48
9526 DATA 47,79,207,207,207,207,
95,63
9527 DATA 248,248,252,252,254,25
4,254,252
9530 DATA 32,33,35,36,39,35,33,3
9
9531 DATA 96,144,204,226,224,192
,240,248
9532 DATA 39,47,47,123,51,35,3,7
9533 DATA 252,246,246,246,244,24
8,240,240
9534 DATA 3,7,6,6,3,3,2,14
9535 DATA 112,112,48,48,48,16,24
,112
9540 DATA 6,9,51,71,7,3,15,31
9541 DATA 4,132,196,36,228,196,1
32,228
9542 DATA 63,111,111,111,47,31,1
5,15
9543 DATA 228,244,244,222,204,19
6,192,224
9544 DATA 14,14,12,12,12,8,24,14
9545 DATA 192,224,96,96,192,192,
128,224
9550 DATA 195,129,36,0,129,219,1
95,231
9555 LET sum=0: FOR n=64696 TO 6
4863: READ a: LET sum=sum+a: POK
E n,a: NEXT n
9557 IF sum<>7831 THEN  PRINT "E
RROR IN LINES 9560-9580": BEEP .
1,20: STOP
9560 DATA 0,0,0,0,0,0,0,1
9561 DATA 0,6,14,28,56,112,224,1
92
9562 DATA 3,103,62,28,60,118,98,
0
9563 DATA 128,0,0,0,0,0,0,0
9564 DATA 0,63,63,60,56,50,16,24
9565 DATA 0,252,252,60,28,76,8,2
4
9566 DATA 12,13,4,7,3,1,0,0
9567 DATA 48,176,32,224,192,128,
0,0
9568 DATA 0,64,40,60,248,252,114
,49
9569 DATA 0,0,0,0,0,0,0,0
9570 DATA 0,0,0,0,0,0,0,0
9571 DATA 128,64,32,16,8,4,2,0
9572 DATA 0,0,0,7,7,7,3,3
9573 DATA 0,0,0,224,224,224,192,
192
9574 DATA 3,3,3,1,1,1,1,0
9575 DATA 192,192,192,192,128,12
8,128,128
9576 DATA 0,0,0,1,3,15,16,32
9577 DATA 0,0,0,128,192,240,8,4
9578 DATA 60,35,24,7,0,0,0,0
9579 DATA 60,196,24,224,0,0,0,0
9580 DATA 0,0,0,0,0,0,0,0
9585 LET sum=0: FOR n=64864 TO 6
5031: READ a: LET sum=sum+a: POK
E n,a: NEXT n
9587 IF sum<>7917 THEN  PRINT "E
RROR IN LINES 9590-9610": BEEP .
1,20: STOP
9590 DATA 0,0,0,0,0,0,0,0
9591 DATA 0,0,4,8,24,36,80,192
9592 DATA 1,2,5,8,244,144,80,48
9593 DATA 96,0,0,128,0,0,0,0
9594 DATA 0,0,0,0,7,28,56,96
9595 DATA 0,0,0,0,224,56,28,6
9596 DATA 64,97,58,30,6,1,0,0
9597 DATA 2,134,92,120,96,128,0,
0
9598 DATA 0,1,2,7,2,1,0,0
9599 DATA 128,192,160,240,160,19
2,128,128
9600 DATA 0,0,0,0,1,3,3,1
9601 DATA 128,128,128,128,192,22
4,224,192
9602 DATA 0,0,0,0,2,13,48,102
9603 DATA 0,0,0,0,0,128,96,24
9604 DATA 152,150,113,25,7,1,0,0
9605 DATA 6,199,158,127,126,248,
96,0
9606 DATA 0,0,0,0,0,0,0,1
9607 DATA 0,6,10,20,40,80,160,64
9608 DATA 2,101,58,28,60,118,98,
0
9609 DATA 128,0,0,0,0,0,0,0
9610 DATA 0,0,0,0,0,0,0,0
9615 LET sum=0: FOR n=65032 TO 6
5199: READ a: LET sum=sum+a: POK
E n,a: NEXT n
9617 IF sum<>13150 THEN  PRINT "
ERROR IN LINES 9620 9640": BEEP
.1,20: STOP
9620 DATA 3,7,13,15,7,2,1,15
9621 DATA 192,224,176,240,224,64
,128,240
9622 DATA 21,35,37,35,33,37,23,6
9623 DATA 168,200,168,201,139,17
2,232,96
9624 DATA 2,2,4,2,2,2,2,14
9625 DATA 64,64,32,64,64,64,64,1
12
9626 DATA 1,3,7,69,199,131,129,1
43
```

```
9627 DATA 128,192,224,160,224,19
2,128,240
9628 DATA 223,91,83,99,99,3,7,6
9629 DATA 254,222,222,222,204,19
2,224,96
9630 DATA 6,6,12,12,4,4,6,28
9631 DATA 96,96,48,48,32,32,96,5
6
9632 DATA 0,0,11,37,39,102,114,1
15
9633 DATA 0,32,164,68,204,222,15
8,190
9634 DATA 255,255,255,127,119,10
3,79,11
9635 DATA 255,255,243,225,225,12
8,192,64
9636 DATA 8,24,8,0,0,0,0,0
9637 DATA 64,48,32,0,0,0,0,0
9638 DATA 0,0,0,0,0,0,0,0
9639 DATA 0,0,0,0,0,0,0,0
9640 DATA 0,0,0,0,0,0,0,0
9645 LET sum=0: FOR n=65200 TO 6
5367: READ a: LET sum=sum+a: POK
E n,a: NEXT n
9647 IF sum<>12569 THEN  PRINT "
ERROR IN LINES 9650-9670": BEEP
.1,20: STOP
9650 DATA 0,0,0,0,0,0,0,2
9651 DATA 0,0,0,0,0,0,0,160
9652 DATA 3,37,85,95,79,132,132,
128
9653 DATA 84,74,250,241,169,165,
149,144
9654 DATA 128,128,0,0,0,0,0,0
9655 DATA 88,64,64,0,0,0,0,0
9656 DATA 0,3,7,5,7,3,2,13
9657 DATA 0,192,224,160,224,192,
64,184
9658 DATA 13,109,155,156,127,55,
5,5
9659 DATA 188,190,118,246,246,24
2,244,184
9660 DATA 6,14,15,15,15,12,11,31
9661 DATA 184,216,232,248,248,24
8,248,252
9662 DATA 0,0,3,71,213,55,115,58
9663 DATA 0,0,192,227,178,236,20
6,92
9664 DATA 25,31,15,15,7,7,7,4
9665 DATA 152,248,240,248,224,22
4,224,32
9666 DATA 7,15,15,6,4,4,6,28
9667 DATA 224,240,224,96,32,32,9
6,56
9668 DATA 0,0,0,0,0,0,0,0
9669 DATA 0,0,0,0,0,0,0,0
9670 DATA 0,0,0,0,0,0,0,0
9675 LET sum=0: FOR n=65368 TO 6
5535: READ a: LET sum=sum+a: POK
E n,a: NEXT n
9677 IF sum<>5801 THEN  PRINT "E
RROR IN LINES 9680 9700": BEEP .
1,20: STOP
9680 DATA 0,0,0,0,0,0,0,0
9681 DATA 0,0,0,0,0,0,0,0
9682 DATA 0,0,0,0,0,0,0,0
9683 DATA 0,0,0,0,0,0,0,0
9684 DATA 0,0,0,0,0,0,0,0
9685 DATA 0,0,0,0,0,0,0,0
9686 DATA 0,0,0,0,0,16,40,36
9687 DATA 0,0,0,0,0,8,20,36
9688 DATA 18,12,0,0,0,0,0,15
9689 DATA 72,48,0,0,0,0,0,240
9690 DATA 18,8,4,0,0,0,0,0
9691 DATA 88,16,32,0,0,0,0,0
9692 DATA 0,0,1,33,35,115,115,12
3
9693 DATA 0,0,192,112,196,196,46
,14
9694 DATA 123,255,255,223,199,13
1,1,0
9695 DATA 62,255,255,239,198,130
,192,192
9696 DATA 0,8,8,12,14,7,1,0
9697 DATA 192,224,96,96,224,192,
128,0
9698 DATA 0,0,0,0,0,0,0,0
9699 DATA 0,0,0,0,0,0,0,0
9700 DATA 0,0,0,0,0,0,0,0
9999 RETURN
```

PROGRAM 4

```
   1 REM ########################
         #Underlined characters#
         #are entered in       #
         #GRAPHICS mode.       #
         ########################
   2 INK 7: POKE 23606,104: POKE
 23607,247
   5 PRINT AT 21,9; FLASH 1;"Sto
p the tape": FOR n=1 TO 200: NEX
T n
  15 RESTORE 15: FOR n=0 TO 10:
READ a: POKE 23300+n,a: NEXT n:
DATA 33,160,88,6,128,54,0,35,16,
251,201
  20 LET cl=7
  30 LET a$="Press any key to st
art this fantasy adventure...Lor
d of Darkness..."
  32 PRINT AT 21,0;a$( TO 32): P
OKE 23306,cl+64: RANDOMIZE USR 2
3300
  33 LET b$=INKEY$: IF b$="" THE
N  LET a$=a$(2 TO )+a$(1): LET c
l=cl-1+7*(cl=1): FOR n=1 TO 20:
NEXT n: GO TO 32
  40 CLS : PRINT AT 10,4; PAPER
2; INK 6;"Please,wait a moment .
.."
  43 GO SUB 9000: GO SUB 8300
  45 GO SUB 9500
  50 GO SUB 8000: GO SUB 8600
1000 REM ##Main Program#########
1005 LET action=INT (liferg/10):
 PRINT AT 11,23;"    ";AT 11,23;
action
1010 PRINT AT 17,1;"Move cursors
   Fight            ";AT 18,1;"Exa
mine         Left,Right view";AT
19,1;"Take               Stop
    ";AT 20,1;"Drop             Ot
her command  ";AT 21,1;"
                              "
1020 LET a$=INKEY$: IF a$="" THE
N  GO TO 1020
1030 LET a=CODE a$: IF a<53 OR (
a>56 AND a<100) OR a>116 THEN  G
O TO 1020
1035 IF a=115 THEN  GO TO 1100
1040 LET a=a-52-43*(a>99): GO SU
B VAL "2000,2000,2000,2000,2200,
2600,2300,1020,1020,1020,1020,10
20,2100,1020,1020,3000,1020,1020
,2100,1020,2500"(5*a-4 TO 5*a-1)
1043 IF PEEK 63584=0 THEN  GO TO
 8750
1045 PRINT AT 11,23;"    ";AT 11
,23;action
1047 IF liferg+2*action<=0 THEN
 GO TO 8650
1048 IF action<=-10 THEN  GO TO
1100
1060 GO TO 1010
1100 LET liferg=liferg+2*action:
 IF liferg>104 THEN  LET liferg=
104
1105 IF liferg<>lifold THEN  GO
SUB 8550
1200 REM ##Action Characters####
1205 LET a$="The characters are
performing actions now.": GO SUB
 8400
1210 FOR n=1 TO 29: IF PEEK (634
52+4*n)=r AND (n>12 OR o(8,1)<>0
) THEN  GO SUB 1300: IF PEEK 635
84=0 OR liferg<=0 THEN  GO TO 86
50+100*(PEEK 63584=0)
1215 NEXT n
1220 FOR n=32 TO 34: IF PEEK (63
452+4*n)=r THEN  GO SUB 1300
1225 NEXT n
1230 IF r=43 AND o(10,1)=50 THEN
  LET a$="The magician says: Bri
ng me the ring, the book and the
 sceptre, and I will help you to
 kill the Lord of Darkness.": GO
 SUB 8400: GO SUB 8450
```

```
1235 IF r=24 AND wiz=0 THEN  LET
 a$="The wizard says: I have the
 power to kill the Balrog.Shall
I attack him?": GO SUB 8400: GO
SUB 8450
1250 GO SUB 8700: GO TO 1000
1300 LET m=1+(n>12)+(n>22)+(n>25
)+(n>29)+(n>30)+(n>31)+(n>32)+(n
>33)
1302 LET ad=138+6*(m-3*(m>3)-3*(
m>6))
1305 LET xco=PEEK (63453+4*n): L
ET yco=PEEK (63454+4*n)
1310 FOR o=1 TO b(m)
1315 IF (wkx-xco)*(wkx-xco)+(wky
-yco)*(wky-yco)<=5 THEN  GO SUB
1400: RETURN
1320 LET dx=(xco<wkx)-(xco>wkx):
 LET dy=(yco<wky)-(yco>wky)
1325 POKE 23675,8+168*(m>3)-88*(
m>6): POKE 23676,254+(m>6)
1330 PRINT  OVER 1; INK 7;AT xco
-2,yco;CHR$ ad+CHR$ (ad+1);AT xc
o-1,yco;CHR$ (ad+2)+CHR$ (ad+3);
AT xco,yco;CHR$ (ad+4)+CHR$ (ad+
5)
1335 LET xco=xco+dx: LET yco=yco
+dy: PRINT  OVER 1; INK 3;AT xco
-2,yco;CHR$ ad+CHR$ (ad+1);AT xc
o-1,yco;CHR$ (ad+2)+CHR$ (ad+3);
AT xco,yco;CHR$ (ad+4)+CHR$ (ad+
5)
1340 POKE 63453+4*n,xco: POKE 63
454+4*n,yco
1345 NEXT o
1350 RETURN
1400 LET b=PEEK (63455+4*n)-INT
(liferg/20)-2*(o(1,1)=0)-(o(3,1)
=0)-2*(o(2,1)=0)-10*(o(10,1)=0)+
INT (RND*6)-2
1410 IF b>=0 THEN  LET liferg=li
ferg-10*b: GO SUB 8550: LET a$="
You're attacked by the "+p$(m)+(
" He hit you." AND liferg>0)+("
He killed you... you're dead." A
ND liferg<=0): GO TO 1490
1420 LET b=PEEK (63455+4*n)+b: L
ET a$="You're attacked by the "+
p$(m)+" You "+("hit him." AND b>
0)+("killed him." AND b<=0)
1430 POKE 63455+4*n,b: IF b<=0 T
HEN  POKE 63452+4*n,0: POKE 2367
5,8+168*(m>3)-88*(m>6): POKE 236
76,254+(m>6): PRINT  OVER 1; INK
 7;AT xco-2,yco;CHR$ ad+CHR$ (ad
+1);AT xco-1,yco;CHR$ (ad+2)+CHR
$ (ad+3);AT xco,yco;CHR$ (ad+4)+
CHR$ (ad+5)
1490 GO SUB 8400: GO SUB 8450: R
ETURN
2000 REM ##Movement#############
2010 LET nx=wkx+1*(a=2)-1*(a=3):
 LET ny=wky+1*(a=4)-1*(a=1)
2012 IF (nx=8 AND NOT (ny=11 AND
 (r$(r,dir)="1"))) OR nx=15 THEN
  RETURN
2016 IF nx+ny-16<0 AND NOT (nx=1
1 AND ny=4 AND r$(r,dir-1+4*(dir
=1))="1") AND NOT (nx=12 AND ny=
3 AND r$(r,dir-1+4*(dir=1))="1"
AND a=1) THEN  RETURN
2018 IF nx-ny+7<=0 AND NOT (nx=1
1 AND ny=18 AND r$(r,dir+1-4*(di
r=4))="1") AND NOT (nx=12 AND ny
=19 AND r$(r,dir+1-4*(dir=4))="1
" AND a=4) THEN  RETURN
2021 FOR n=0 TO 1: IF PEEK (2252
8+32*nx+ny+n*(a<>1)*(a<>4)+(a=4)
)=5 AND PEEK (22528+32*(nx-1)+ny
+n*(a<>1)*(a<>4)+(a=4))=5 THEN
RETURN
2022 IF PEEK (22528+32*nx+ny+n*(
a<>1)*(a<>4)+(a=4))=3 AND PEEK (
22528+32*(nx-2)+ny+n*(a<>1)*(a<>
4)+(a=4))=3 THEN  RETURN
2024 NEXT n
2030 IF nx=8 OR (nx=11 AND ny=4)
 OR (nx=12 AND ny=3) OR (nx=11 A
ND ny=18) OR (nx=12 AND ny=19) T
HEN  GO TO 2050
```

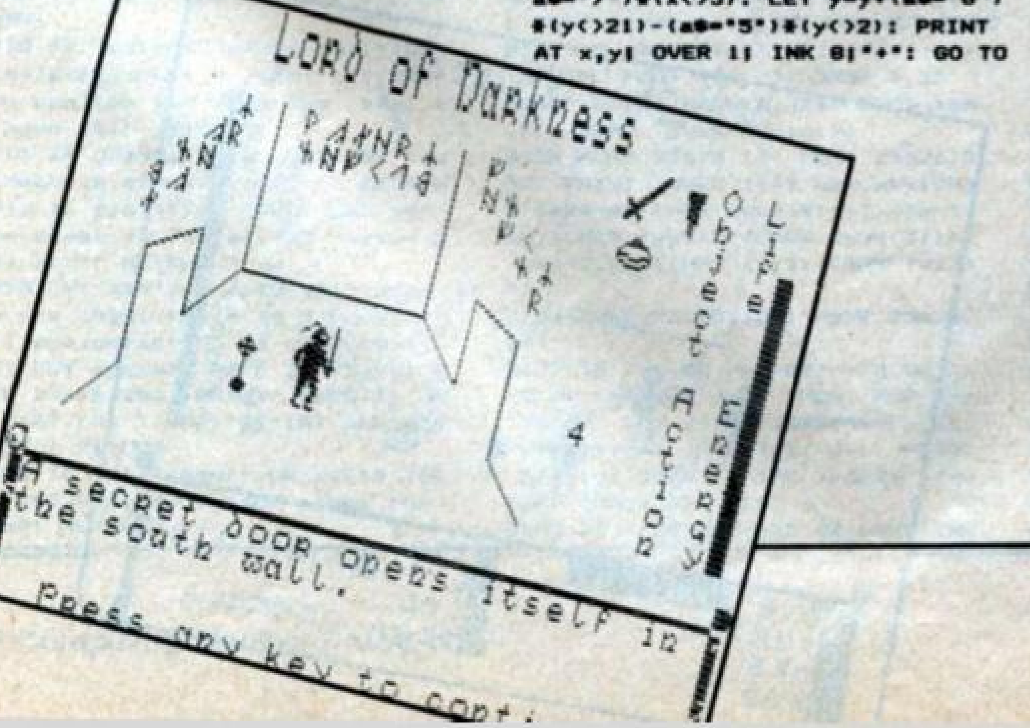
SPECTRUM PROGRAMMING

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2035 POKE 23675,16: POKE 23676,2
52: PRINT  INK 8; OVER 1;AT wkx,
wky;CHR$ (wkd+4)+CHR$ (wkd+5);AT
 wkx-1,wky;CHR$ (wkd+2)+CHR$ (wk
d+3);AT wkx-2,wky;CHR$ (wkd)+CHR
$ (wkd+1)
2037 LET wkd=wkd*(a=3 OR a=2)+15
2*(a=1)+150*(a=4)
2040 PRINT  INK 8; OVER 1;AT nx,
ny;CHR$ (wkd+4)+CHR$ (wkd+5);AT
nx-1,ny;CHR$ (wkd+2)+CHR$ (wkd+3
);AT nx-2,ny;CHR$ (wkd)+CHR$ (wk
d+1)
2045 LET wkx=nx: LET wky=ny: LET
 action=action-1-dark: RETURN
2050 LET exit=1*(ny<=4)+2*(nx=8)
+3*(ny)=18)
2052 LET sum=dir+exit: LET r=r-7
*(sum=3 OR sum=7)+7*(sum=5)-1*(s
um=2 OR sum=6)+1*(sum=4)
2054 LET wkx=12+2*(exit=2): LET
wky=4+7*(exit=2)+14*(exit=1)
2055 LET wkd=wkd*(exit=2)+152*(e
xit=1)+150*(exit=3)
2056 LET action=action-1: GO SUB
 8100: RETURN
2100 REM **Left Right view******
2105 PRINT AT 18,16+5*(a=19); FL
ASH 1;("Left" AND a=13)+("Right"
 AND a=19)
2110 LET dir=dir+(-1+4*(dir=1))*
(a=13)+(1-4*(dir=4))*(a=19)
2120 LET x=wkx: LET y=wky: GO SU
B 2190: LET wkx=x: LET wky=y
2125 LET x=chx: LET y=chy: GO SU
B 2190: LET chx=x: LET chy=y
2130 FOR n=1 TO 10: IF o(n,1)<>0
 THEN  LET x=o(n,2): LET y=o(n,3
): GO SUB 2190: LET o(n,2)=x: LE
T o(n,3)=y
2131 NEXT n
2140 FOR n=1 TO 34: IF PEEK (634
52+4*n)<>0 THEN  LET x=PEEK (634
53+4*n): LET y=PEEK (63454+4*n):
 GO SUB 2190: POKE 63453+4*n,x:
POKE 63454+4*n,y
2141 NEXT n
2170 GO SUB 8100
2180 RETURN
2190 LET t=(11*x+4*y-99)/(x-5):
LET d=t-7: LET e=SQR (x*x-18*x+8
1+y*y-2*t*y+t*t): LET f=5*SQR (1
+(y*y-22*y+121)/(x*x-10*x+25))
2191 IF a=13 THEN  LET x=INT (9.
5+5*d/8): LET y=INT (6.5+x-e*(2*
x-10)/f)
2192 IF a=19 THEN  LET x=INT (14
.5-5*d/8): LET y=INT (16-x+e*(2*
x-10)/f)
2199 RETURN
2200 REM **Drop*****************
2203 IF dark THEN  LET a$="It's
too dark to drop something.": GO
 TO 2280
2205 IF object=1 THEN  LET a$="Y
ou can't drop a thing, but if yo
u insist, take something and the
n drop it.": GO TO 2280
2207 LET x=2: LET y=23
2208 PRINT AT x,y; OVER 1; INK 8
;"+"
2210 LET a$="Move the cursor wit
h the cursor keys to the object
you want to drop.Then press ENTE
R, or DELETE to return to main m
enu.": GO SUB 8400
2215 LET a$=INKEY$: IF (a$<"5" O
R a$>"8") AND CODE a$<>12 AND CO
DE a$<>13 THEN  GO TO 2215
2217 IF CODE a$=12 THEN  PRINT A
T x,y; OVER 1; INK 8;"+": RETURN

2218 IF CODE a$=13 THEN  GO TO 2
230
2220 PRINT AT x,y; OVER 1; INK 8
;"+"
2222 LET x=x-(a$="7")*(x<>2)+(a$
="6")*(x<>7): LET y=y-(a$="5")*(
y<>23)+(a$="8")*(y<>26)
2224 PRINT AT x,y; OVER 1; INK 8
;"+"
2226 GO TO 2215
2230 LET nr=x-1-(x<>2*INT (x/2))
+INT ((y-23)/2)
2232 IF nr)=object THEN  LET a$=
"Do you want to drop some air???
  I don't think this has a signi
ficant effect. Press any key to
drop an existing object.": GO SU
B 8400: GO SUB 8450: GO TO 2210
2233 LET a$="You drop the "+o$(q
(nr))
2234 POKE 23675,96+88*(q(nr)<=5)
: POKE 23676,252+(q(nr)>=6): LET
 a=140+4*(q(nr)-5*(q(nr)>=6)): P
RINT  INK 5; OVER 1;AT wkx-1,wky
;CHR$ a+CHR$ (a+1);AT wkx,wky;CH
R$ (a+2)+CHR$ (a+3)
2235 IF q(nr)=4 THEN  LET lit=0
2236 LET o(q(nr),1)=r: LET o(q(n
r),2)=wkx: LET o(q(nr),3)=wky: L
ET object=object-1: LET q(nr)=q(
object)
2237 LET action=action-1: GO SUB
 8500
2280 GO SUB 8400: GO SUB 8450: R
ETURN
2300 REM **Fight****************
2305 LET x=3: LET y=2
2310 PRINT AT x,y; OVER 1; INK 8
;"+"
2315 LET a$="Move the cursor wit
h the cursor keys to the creatur
e you want to attack.Then press
ENTER, or DELETE to return to ma
in menu.": GO SUB 8400
2320 LET a$=INKEY$: IF (a$<"5" O
R a$>"8") AND CODE a$<>13 AND CO
DE a$<>12 THEN  GO TO 2320
2321 IF CODE a$=12 THEN  PRINT
OVER 1; INK 8;AT x,y;"+": RETURN

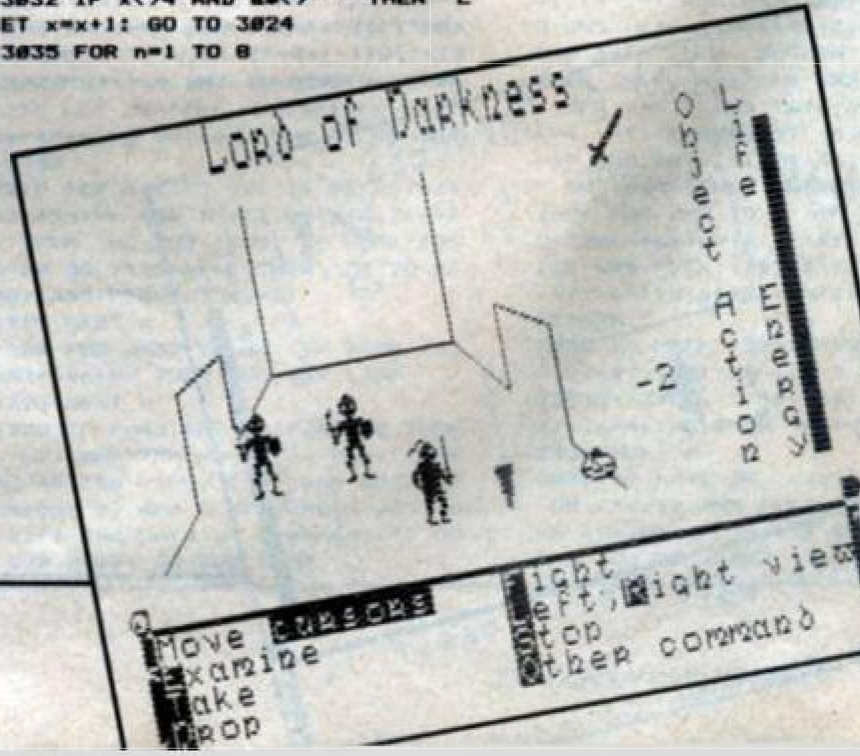
2322 IF CODE a$=13 THEN  LET a$=
"Please, wait a moment.": GO SUB
 8400: GO TO 2330
2326 PRINT AT x,y; OVER 1; INK 8
;"+": LET x=x+(a$="6")*(x<>14)-(
a$="7")*(x<>3): LET y=y+(a$="8")
*(y<>21)-(a$="5")*(y<>2): PRINT
AT x,y; OVER 1; INK 8;"+": GO TO
 2320
2330 FOR m=0 TO 2: FOR o=0 TO 1:
 FOR n=1 TO 34: IF PEEK (63453+4
*n)-m=x AND PEEK (63454+4*n)+o=y
 AND PEEK (63452+4*n)=r THEN  GO
 TO 2335
2332 NEXT n: NEXT o: NEXT m
2333 LET a$="You are using your
weapons against the air.Search a
n opponent before you want to tr
y again!": GO SUB 8400: GO SUB 8
450: GO TO 2315
2335 IF (PEEK (63453+4*n)-wkx)*(
PEEK (63453+4*n)-wkx)+(PEEK (634
54+4*n)-wky)*(PEEK (63454+4*n)-w
ky)>5 THEN  LET a$="Unless you h
ave a very long weapon, the crea
ture is too far away to attack i
t.": GO SUB 8400: GO SUB 8450: G
O TO 2315
2340 LET action=action-5: LET b=
INT (lifterg/20)+2*(o(1,1)=0)+(o(
3,1)=0)+(o(2,1)=0)+10*(o(10,1)=0
)-PEEK (63455+4*n)+INT (RND*6)-2
2341 LET b$=p$(1+(n>12)+(n>22)+(
n>25)+(n>29)+(n>30)+(n>31)+(n>32
)+(n>33))
2342 PRINT AT x,y; OVER 1; INK 8
;"+"
2347 IF b<=0 THEN  LET lifterg=li
ferg+b*10: GO SUB 8550: LET a$="
You attacked the "+b$+"         "+
("but he hit you." AND liferg>0)
+("but this creature k'lled you.
" AND liferg<=0): GO TO 2390
2350 LET a=PEEK (63455+4*n)-b
2351 LET a$="You attacked the "+
b$+"          "+("He is wounded." A
ND a>0)+("You killed him." AND a
<=0)
2355 POKE 63455+4*n,a
2360 IF a>0 THEN  GO TO 2390
2361 POKE 63452+4*n,0
2365 POKE 23675,8+168*(n>=26)-88
*(n>=32): POKE 23676,254+(n>=32)
: LET o=138+6*(n<=12 OR (n>=26 A
ND n<=29) OR n=32)+12*((n>=13 AN
D n<=22) OR n=30 OR n=33)+18*((n
>=23 AND n<=25) OR n=31 OR n=34)
: LET x=PEEK (63453+4*n): LET y=
PEEK (63454+4*n)
2370 PRINT  OVER 1; INK 7;AT x-2
,y;CHR$ o+CHR$ (o+1);AT x-1,y;CH
R$ (o+2)+CHR$ (o+3);AT x,y;CHR$
(o+4)+CHR$ (o+5)
2375 GO SUB 8700
2390 GO SUB 8400: GO SUB 8450: R
ETURN
2399 RETURN
2500 REM **Take*****************
2503 IF dark THEN  LET a$="It's
too dark to drop something.": GO
 TO 2590
2505 IF object=7 THEN  LET a$="Y
ou're carrying to much. Drop som
ething and then try again.": GO
TO 2590
2507 LET x=3: LET y=2
2510 PRINT AT x,y; OVER 1; INK 8
;"+"
2522 LET a$="Move the cursor wit
h the cursor keys to the object
you want to take.Then press ENTE
R, or DELETE to return to main m
enu.": GO SUB 8400
2524 LET a$=INKEY$: IF (a$<"5" O
R a$>"8") AND CODE a$<>13 AND CO
DE a$<>12 THEN  GO TO 2524
2525 IF CODE a$=13 THEN  GO TO 2
530
2526 IF CODE a$=12 THEN  PRINT A
T x,y; OVER 1; INK 8;"+": RETURN

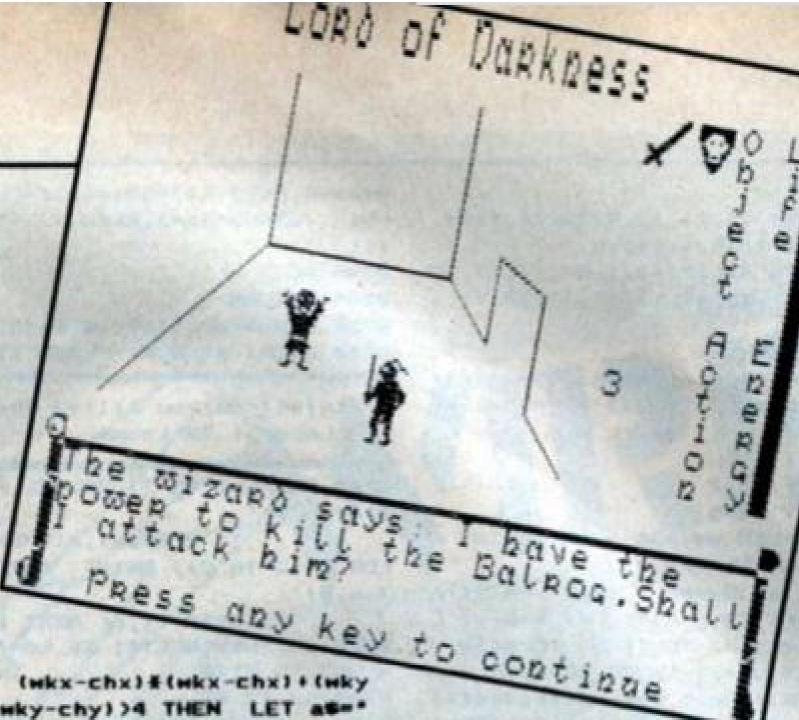
2528 PRINT AT x,y; OVER 1; INK 8
;"+": LET x=x+(a$="6")*(x<>14)-(
a$="7")*(x<>3): LET y=y-(a$="5")
*(y<>2)+(a$="8")*(y<>21): PRINT
AT x,y; OVER 1; INK 8;"+": GO TO
 2524
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2530 FOR m=0 TO 1: FOR o=0 TO 1: FOR n=1 TO 10: IF o(n,2)-m=x AND o(n,3)+o=y AND o(n,1)=r THEN GO TO 2540
2532 NEXT n: NEXT o: NEXT m
2535 LET a$="I can't see any portable object at this position.": GO SUB 8400: GO SUB 8450: GO TO 2522
2540 IF (o(n,2)-wkx)*(o(n,2)-wkx)+(o(n,3)-wky)*(o(n,3)-wky)>5 THEN LET a$="The object is too far away to take it. Press any key to continue.": GO SUB 8400: GO SUB 8450: GO TO 2522
2550 LET a$="You take the "+o$(n)
2555 LET q(object)=n: LET object=object+1: GO SUB 8500: PRINT AT x,y; OVER 1; INK 8;"+"
2560 PRINT OVER 1; INK 7;AT o(n,2),o(n,3);CHR$ (a+2)+CHR$ (a+3);AT o(n,2)-1,o(n,3);CHR$ a+CHR$ (a+1)
2561 LET o(n,1)=0
2562 GO SUB 8700
2571 LET action=action-3
2590 GO SUB 8400: GO SUB 8450: RETURN
2600 REM **Examine***************
2603 IF dark THEN LET a$="You cannot examine objects because it's too dark.": GO TO 2690
2605 LET x=3: LET y=2
2610 LET a$="Move the cursor with the cursor keys to the object you want to examine. Then press ENTER, or DELETE to return to main menu.": GO SUB 8400
2612 PRINT AT x,y; OVER 1; INK 8;"+"
2615 LET b$=INKEY$: IF (b$<"5" OR b$>"8") AND CODE b$<>12 AND CODE b$<>13 THEN GO TO 2615
2616 IF CODE b$=12 THEN PRINT AT x,y; OVER 1; INK 8;"+": RETURN
2617 IF CODE b$=13 THEN GO TO 2620
2618 PRINT AT x,y; OVER 1; INK 8;"+": LET x=x+(b$="6")*(x<>14)-(b$="7")*(x<>3): LET y=y+(b$="8")*(y<>21)-(b$="5")*(y<>2): GO TO 2612
2620 LET a$="Please, wait a moment.": GO SUB 8400
2621 FOR n=0 TO 1: FOR m=0 TO 1: FOR o=1 TO 10: IF x=o(o,2)-n AND y=o(o,3)+m AND o(o,1)=r THEN GO TO 2650
2622 NEXT o: NEXT m: NEXT n
2625 FOR n=0 TO 2: FOR m=0 TO 1: FOR o=1 TO 34: IF x=PEEK (63453+4*o)-n AND y=PEEK (63454+4*o)-m AND PEEK (63452+4*o)=r THEN GO TO 2660
2627 NEXT o: NEXT m: NEXT n
2630 FOR n=0 TO 1: FOR m=0 TO 1: IF x=chx-n AND y=chy+m AND r=15 THEN LET a$="This is a wooden chest.It looks very heavy.": GO TO 2690
2631 NEXT m: NEXT n
2635 IF x+y-16>=0 AND x>=9 AND x-y+7>=0 THEN LET a$="The floor is made of stone.": GO TO 2690
2640 LET a$="The walls are made of heavy bricks."+("There are some strange inscriptions on them." AND r=28): GO TO 2690
2650 RESTORE 2651: FOR n=1 TO o: READ a$: NEXT n: GO TO 2690
2651 DATA "It's a normal sword,often used by men and elves.","This shield is made of iron. A white skull is painted on it.","This axe is probably made by dwarves.","This torch has recently been used.","This a tinder box.It is used to make fire."
2652 DATA "It is a rusty key.","There is a very valuable diamond in the ring.","A picture of a skeleton is painted on this sceptre.","It is a very old book.Perhaps something is wr!tten in it.","The sword flashes brightly."
2660 LET m=1+(o>12)+(o>22)+(o>25)+(o>29)+(o>30)+(o>31)+(o>32)+(o>33): RESTORE 2661: FOR n=1 TO m: READ a$: NEXT n: GO TO 2690
2661 DATA "This is an undead skeleton. He's armed with a knife made of bone.","This person is a guard.He has a shield and a scimitar.","This creature is a bat.It has no arms but very sharp teeth and claws.","A giant spider, probably very hungry!!"
2662 DATA "This person is a magician.","A wizard,he looks friendly.","You can feel the presence of a being,but it is invisible.","The Lord of Darkness!!!","A wyvern, or a winged serpent."
2690 LET action=action-4: GO SUB 8400: GO SUB 8450: PRINT AT x,y; OVER 1; INK 8;"+": RETURN
3000 REM **Other Commands*******
3004 POKE 23675,16: POKE 23676,252
3005 LET a$="Enter your command...": GO SUB 8400
3006 LET x=18: LET y=1: LET a$=""
3010 PRINT AT x,y; FLASH 1;"▒"
3015 LET b$=INKEY$: IF b$="" THEN GO TO 3015
3017 IF CODE b$=12 THEN LET a$=a$( TO LEN a$-(x<>18 OR y<>1)): PRINT AT x,y;" ": LET y=y-(y<>1)+29*(y=1 AND x<>18): LET x=x-(y=30): GO TO 3010
3018 IF CODE b$=13 AND a$<>"" THEN GO TO 3020
3019 PRINT AT x,y;b$: LET y=y+(y<>30)-29*(y=30 AND x<>21): LET x=x+(y=1): LET a$=a$+b$: FOR n=1 TO 10: NEXT n: GO TO 3010
3020 LET d$="": LET e$="": LET f$="": LET g$="": LET x=1
3021 IF a$(LEN a$)=" " THEN LET a$=a$( TO LEN a$-1): GO TO 3021
3022 LET a$=a$+" "
3024 IF a$(1)=" " THEN LET a$=a$(2 TO ): GO TO 3024
3025 LET n=2
3026 IF a$(n)<>" " THEN LET n=n+1: GO TO 3026
3027 IF x=1 THEN LET d$=a$( TO n-1)
3028 IF x=2 THEN LET e$=a$( TO n-1)
3029 IF x=3 THEN LET f$=a$( TO n-1)
3030 IF x=4 THEN LET g$=a$( TO n-1)
3031 LET a$=a$(n TO )
3032 IF x<>4 AND a$<>" " THEN LET x=x+1: GO TO 3024
3035 FOR n=1 TO 8
3036 IF d$=c$(n, TO (LEN d$)*(LEN d$<5)+5*(LEN d$>=5)) THEN GO TO 3040
3037 NEXT n
3038 LET a$="I don't understand your command.I don't know how to '"+d$+"' something.": GO TO 3050
3040 GO SUB 3000+100*n
3050 GO SUB 8400: GO SUB 8450: RETURN
3100 IF o(5,1)<>0 THEN LET a$="You are not able to make light without the right equipment.": RETURN
3105 IF o(4,1)<>0 THEN LET a$=("You cannot light the "+e$+"." AND e$<>"")+("You don't have anything to light." AND e$=""): RETURN
3110 IF lit=1 THEN LET a$="The torch already burns.Don't waste your forces like this!": RETURN
3115 LET a$="The torch is on fire now. Wow,what a light it gives!": LET lit=1: LET action=action-2: GO SUB 8100: RETURN
3200 IF o(4,1)<>0 OR lit=0 OR e$<>"torch" THEN LET a$="This is not possible.": RETURN
3210 LET a$="You put out the torch.": LET lit=0: LET action=action-2: GO SUB 8100: RETURN
3300 IF f$<>"to" THEN LET a$="I don't understand your command.": RETURN
3310 IF g$<>"magician" OR r<>PEEK 63572 THEN LET a$="This is not possible.": RETURN
3320 FOR n=1 TO 10: IF e$<>o$(n, TO (LEN e$)*(LEN e$<11)+11*(LEN e$>=11)) THEN NEXT n: LET a$="I don't know what a '"+e$+"' is.": RETURN
3325 IF o(n,1)<>0 THEN LET a$="You don't have the "+e$+", so you cannot give it away.": RETURN
3330 IF (wkx-PEEK 63573)*(wkx-PEEK 63573)+(wky-PEEK 63574)*(wky-PEEK 63574)>5 THEN LET a$="The magician is too far away to accept the object.": RETURN
3340 LET a$="The magician takes the "+e$+".": LET o(n,1)=50: LET o(n,2)=PEEK 63573: LET o(n,2)=PEEK 63574
3345 LET object=object-1: FOR m=1 TO object: IF q(m)<>n THEN NEXT m
3350 LET q(m)=q(object): GO SUB 8500
3355 IF o(7,1)<>50 OR o(8,1)<>50 OR o(9,1)<>50 THEN RETURN
3360 GO SUB 8400: GO SUB 8450: LET a$="The wizard says:'You gave me three valuable objects.I give you the magical sword to kill the Lord of Darkness.": LET o(10
```






```
,1)=0: LET q(object)=10: LET obj
ect=object+1: GO SUB 8500: RETUR
N
3400 IF (e$<>CHR$ 115+CHR$ 117+C
HR$ 110 OR r<>28) AND (e$<>"yes"
 OR r<>24 OR PEEK 63576<>24) THE
N  LET a$="Nothing happens.": RE
TURN
3410 IF e$="yes" THEN  LET a$="T
he wizard hears your answer.He s
ays: I've just killed the Balrog
 in magical combat.": LET wiz=1:
 POKE 63580,0: RETURN
3420 LET a$="A secret door opens
 itself in the south wall.": LET
 r$(28,3)="1": LET r$(35,1)="1":
 GO SUB 8100: RETURN
3500 IF dark THEN  LET a$="It's
too dark to read.": RETURN
3510 IF o(9,1)<>0 OR (e$<>"book"
 AND e$<>"") THEN  LET a$="You c
annot read without a book.": RET
URN
3520 LET a$="The book contains s
everal chapters...three I think.
 specify the chapter you want to
 read. (Press 1,2 or 3)": GO SUB
 8400
3530 LET a$=INKEY$: IF a$<"1" OR
 a$>"3" THEN  GO TO 3530
3535 LET action=action-1: GO TO
3530+10*(CODE a$-48)
3540 LET a$="Chapter one: This p
art contains a translation of ru
ne inscriptions into normal text
.": GO TO 3580-10*(r=28)
3550 LET a$="Chapter two: 'To ki
ll the Lord of Darkness, use the
 magic sword hidden in the castl
e.'": RETURN
3560 LET a$="Chapter three,it sa
ys: 'Instead of reading this boo
k and wasting your time, you wou
ld better kill the Lord.'": RETU
RN
3570 GO SUB 8400: GO SUB 8450: L
ET a$="The signs on the wall mea
n:... Round as a ball, as light
the best.Birth and dead, in east
 and west."
3580 RETURN
3600 LET a$="You're doing fine..
."
3605 IF r=6 THEN  LET a$="Agains
t undead types, an object of pow
er can be useful."
3610 IF r=28 THEN  LET a$="Try t
o translate the runes."
3615 IF r=30 THEN  LET a$="To fi
nd the book, to find the sword,
enter the area of spider lord."
3620 IF r=46 THEN  LET a$="A tor
ch can be a big advantage."
3625 IF r=47 THEN  LET a$="no sw
obd back to wall go left"
3630 RETURN
3700 IF e$<>"chest" OR r<>15 THE
N  LET a$=("You cannot open the
"+e$ AND e$<>"")+("I don't know
what to open" AND e$="")+".": RE
TURN
3710 IF (wkx-chx)*(wkx-chx)+(wky
-chy)*(wky-chy)>5 THEN  LET a$="
You are too far from the chest t
o open it.": RETURN
3715 IF open=1 THEN  LET a$="The
 chest is already open.": RETURN
3717 IF o(6,1)<>0 THEN  LET a$="
The chest is locked.You cannot o
pen it.": RETURN
3720 LET a$="You open the chest.
In the chest there is a book.":
LET action=action-2: LET o(9,1)=
15: LET open=1: POKE 23675,96: P
OKE 23676,253: PRINT  OVER 1; IN
K 5;AT chx-1,chy;"BC";AT chx,chy
;"DE": RETURN
3800 IF e$<>"chest" OR r<>15 THE
N  LET a$="You cannot close the
"+e$: RETURN
3810 IF (wkx-chx)*(wkx-chx)+(wky
-chy)*(wky-chy)>4 THEN  LET a$="
The chest is too far away to clo
se it.": RETURN
3815 IF open=0 THEN  LET a$="The
 chest is already closed.": RETU
RN
3820 LET a$="You close the chest
.": LET open=0: LET action=actio
n-2: RETURN
8000 REM **Display***************
8010 BORDER 0: PAPER 0: INK 9: C
LS : PAPER 8
8015 POKE 23675,16: POKE 23676,2
52
8020 FOR n=16 TO 21: PRINT AT n,
1; PAPER 6;"
              ": NEXT n: PRINT  INK
6;AT 16,0;"▐";AT 16,31;"▌";AT 17
,0;"▐";AT 17,31;"w";AT 18,0;"w";
AT 18,31;"▌";AT 19,0;"▐";AT 19,3
1;"▛";AT 20,0;"▜";AT 20,31;"▌";A
T 21,0;"▟";AT 21,31;"▙"
8030 PLOT 8,40: DRAW 239,0: PLOT
 8,41: DRAW 239,0
8055 LET q$="Object ActionLife
 Energy": FOR n=2 TO 14: PRINT A
T n,27;q$(n-1);AT n,29;q$(n+12):
 NEXT n
8057 FOR n=1 TO 104: PLOT 241,55
+n: DRAW 5,0: NEXT n: GO SUB 850
0: GO SUB 8100: RETURN
8100 REM **Draw Room*************
8103 LET dark=(r=33 OR r=34 OR r
=40 OR r=41 OR r=47) AND lit=0
8105 FOR n=2 TO 15: PRINT AT n,2
; INK 7-7*dark;"
              ": NEXT n: IF dark THEN  LET
 a$="It's very dark here.I can't
 see a thing.": GO SUB 8400: GO
SUB 8450: RETURN
8110 PLOT 16,56: DRAW 48,48: DRA
W 63,0: DRAW 48,-48: PLOT 64,104
: DRAW 0,47: PLOT 127,104: DRAW
0,47
8120 IF r$(r,dir)="1" THEN  PLOT
 87,104: DRAW 0,24: DRAW 17,0: D
RAW 0,-24: PLOT 87,104: DRAW  OV
ER 1;16,0
8121 IF r$(r,dir-1+4*(dir=1))="1
" THEN  PLOT 31,71: DRAW 0,33: D
RAW 17,8: DRAW 0,-24: PLOT 31,71
: DRAW  OVER 1;16,16
8122 IF r$(r,dir+1-4*(dir=4))="1
" THEN  PLOT 160,71: DRAW 0,33:
DRAW -17,8: DRAW 0,-24: PLOT 160
,71: DRAW  OVER 1;-16,16
8130 POKE 23675,16: POKE 23676,2
52: PRINT  OVER 1;AT wkx,wky;CHR
$ (wkd+4)+CHR$ (wkd+5);AT wkx-1,
wky;CHR$ (wkd+2)+CHR$ (wkd+3);AT
 wkx-2,wky;CHR$ (wkd)+CHR$ (wkd+
1)
8131 POKE 23675,104: POKE 23676,
251
8132 IF r=6 OR r=7 OR r=13 OR r=
14 OR r=20 OR r=21 THEN  FOR n=1
 TO 10: LET x=INT (RND*6+9): LET
 y=16-x+INT (RND*(2*x-8)): PRINT
 AT x,y; OVER 1; INK 7;CHR$ (144
+INT (RND*3)): NEXT n
8133 IF r=25 OR r=32 OR r=39 THE
N  FOR n=1 TO 10: LET x=INT (RND
*6+9): LET y=16-x+INT (RND*(2*x-
8)): PRINT AT x,y; OVER 1; INK 7
;CHR$ (147+INT (RND*2)): NEXT n
8134 IF r=15 THEN  PRINT  OVER 1
; INK 7;AT chx,chy;"▙ ";AT chx-1
,chy;"▛▟"
8135 IF r=28 THEN  PRINT  OVER 1
;AT 3,6;"D    ABCD  G";AT 4,5;"
C  EFGHIJ  FE";AT 5,4;"EF
      GH";AT 6,3;"J
 ED";AT 7,3;"B                 C"
8150 FOR n=1 TO 10: IF o(n,1)<>r
 THEN  GO TO 8160
8152 POKE 23675,96+88*(n<6): POK
E 23676,252+(n>5): LET o=140+4*(
n-5*(n>5)): PRINT  INK 5; OVER 1
;AT o(n,2)-1,o(n,3);CHR$ o+CHR$
(o+1);AT o(n,2),o(n,3);CHR$ (o+2
)+CHR$ (o+3)
8160 NEXT n
8170 FOR n=1 TO 34: IF PEEK (634
52+4*n)<>r THEN  GO TO 8180
8172 POKE 23675,8+168*(n>=26)-88
*(n>=32): POKE 23676,254+(n>=32)
: LET o=138+6*(n<=12 OR (n>=26 A
ND n<=29) OR n=32)+12*((n>=13 AN
D n<=22) OR n=30 OR n=33)+18*((n
>=23 AND n<=25) OR n=31 OR n=34)
: LET x=PEEK (63453+4*n): LET y=
PEEK (63454+4*n)
8174 PRINT  INK 3; OVER 1;AT x-2
,y;CHR$ o+CHR$ (o+1);AT x-1,y;CH
R$ (o+2)+CHR$ (o+3);AT x,y;CHR$
(o+4)+CHR$ (o+5)
8180 NEXT n
8182 IF r=5 THEN  LET a$="A stra
nge voice says: Go back,the evil
 skeletons will kill you.Only an
 object of power frightens them.
": GO SUB 8400: GO SUB 8450
8199 RETURN
8300 REM **Start new Game********
8305 RESTORE 8335
8310 LET r=9: LET dir=1: LET wkx
=14: LET wky=11: LET wkd=152: LE
T liferg=104: LET lifold=104: DI
M q(6): LET object=2: LET q(1)=1
: LET wiz=0: LET chx=10: LET chy
=8: LET lit=0: LET open=0
8330 DIM o(10,3): FOR n=1 TO 10:
 FOR m=1 TO 3: READ a: LET o(n,m
)=a: NEXT m: NEXT n
8335 DATA 0,0,0,1,10,8,8,14,5,2,
14,16,2,14,20
8336 DATA 36,14,11,13,10,8,32,11
,11,65,10,8,50,12,5
8340 FOR n=63456 TO 63591: READ
a: POKE n,a: NEXT n
8341 DATA 6,12,18,10,6,11,11,10,
7,14,11,10,7,11,14,10,13,12,6,10
,13,10,11,10,14,12,4,10,14,14,11
,10,20,12,18,10,20,12,8,10,21,14
,11,10,21,10,11,10
8342 DATA 1,12,11,5,2,12,4,5,2,1
2,18,5,8,12,11,5,10,12,11,5,40,1
2,18,5,40,12,4,5,40,9,14,5,40,9,
8,5,40,13,11,5
8343 DATA 44,12,6,10,45,12,6,10,
```

▶ ▶ ▶

```
46,12,6,10
8344 DATA 15,11,11,9,22,11,11,9,
29,11,11,9,36,11,11,9
8345 DATA 43,12,11,1,24,11,11,30
,32,11,11,25,49,11,11,13,35,11,1
1,11
8399 RETURN
8400 REM **Print Message*******
8405 FOR m=17 TO 21: PRINT AT m,
1;"
 ": NEXT m
8406 LET m=17
8410 LET px=31
8415 IF LEN a$<=30 THEN  PRINT A
T m,1;a$: RETURN
8420 IF a$(px)=" " THEN  PRINT A
T m,1;a$( TO px-1): LET m=m+1: L
ET a$=a$(px+1 TO ): GO TO 8410
8425 LET px=px-1: GO TO 8420
8450 REM **Wait for key********
8451 IF SCREEN$ (21,1)<>"" AND S
CREEN$ (21,2)<>"" THEN  PRINT AT
 21,3;"Press any key to continue
"
8460 LET a$=INKEY$: IF INKEY$=""
 THEN  GO TO 8460
8470 RETURN
8500 REM **Print Objects*******
8503 FOR m=2 TO 7: PRINT AT m,23
;"    ": NEXT m
8505 FOR m=1 TO object-1
8510 POKE 23675,96+88*(q(m)<=5):
 POKE 23676,252+(q(m)>=6)
8515 LET a=140+4*(q(m)-5*(q(m)>5
)): LET px=2*INT (m/2+.5): LET p
y=23+2*(m/2=INT (m/2)): PRINT  I
NK 5;AT px,py;CHR$ a+CHR$ (a+1);
AT px+1,py;CHR$ (a+2)+CHR$ (a+3)
8520 NEXT m
8530 RETURN
8550 REM **Plot Life energy*****
8555 IF liferg<0 THEN  LET lifer
g=0
8560 IF lifold>liferg THEN  FOR
p=lifold TO liferg+1 STEP -1: PL
OT  OVER 1;241,55+p: DRAW  OVER
1;5,0: BEEP .01,20: NEXT p
8565 IF lifold<liferg THEN  FOR
p=lifold+1 TO liferg: PLOT 241,5
5+p: DRAW 5,0: BEEP .01,20: NEXT
 p
8570 LET lifold=liferg: RETURN
8600 REM **Title*****************
8610 LET q$="Lord of Darkness"
8620 FOR n=1 TO LEN q$: LET ad=6
3336+8*CODE q$(n)
8630 FOR m=0 TO 7: FOR o=0 TO 1
8640 POKE 16390+n+512*(m-4*(m)=4
))+32*(m)=4)+256*o,PEEK (ad+m):
NEXT o: NEXT m: NEXT n
8649 RETURN
8650 REM **Dead*****************
8660 FOR n=2 TO 14: PRINT AT n,3
0;" ": NEXT n: PRINT AT 8,0;"
      You're dead
  You didn't survive
    this adventure
"
8665 FOR n=0 TO 7: PRINT AT n,0;
 PAPER 0;"
          ": BEEP .1,-n: NEXT n:
 FOR n=13 TO 21: PRINT AT n,0; P
APER 0;"
        ": BEEP .1,-n: NEXT n
8666 PRINT AT 21,0; FLASH 1;"Key
 Key Key Key Key Key Key Key "
8667 LET b$=INKEY$: IF b$="" THE
N  GO TO 8667
8670 GO TO 40
8700 REM **Paint objects persons
8710 FOR n=1 TO 10: IF o(n,1)=r
THEN  PRINT  OVER 1; INK 5;AT o(
n,2)-1,o(n,3);"  ";AT o(n,2),o(n
,3);"  "
8720 NEXT n
8730 FOR n=1 TO 34: IF PEEK (634
52+4*n)=r THEN  PRINT  OVER 1; I
NK 3;AT PEEK (63453+4*n)-2,PEEK
(63454+4*n);"  ";AT PEEK (63453+
4*n)-1,PEEK (63454+4*n);"  ";AT
PEEK (63453+4*n),PEEK (63454+4*n
);"  "
8740 NEXT n
8745 RETURN
8750 REM **Won!!!***************
8760 PRINT AT 8,0; FLASH 1;"
                              Con
gratulations,you killed the
    Lord of Darkness
"
8765 FOR n=0 TO 7: PRINT  PAPER
0;AT n,0;"
             ": BEEP .1,n: NEXT n:
FOR n=12 TO 21: PRINT  PAPER 0;A
T n,0;"
        ": BEEP .1,n: NEXT n
8770 LET b$=INKEY$: IF b$="" THE
N  GO TO 8770
8780 GO TO 40
9000 REM **Initialisation*******
9005 RESTORE 9020
9010 DIM r$(49,4): FOR n=1 TO 49
: READ r$(n): NEXT n
9020 DATA "0100","0111","0101","
0011","0110","0101","0011"
9021 DATA "0100","1111","0011","
1100","1011","0110","1011"
9022 DATA "0010","1010","1100","
0101","1001","1100","1011"
9023 DATA "1010","1110","0011","
0110","0101","0101","1001"
9024 DATA "1110","1011","1010","
1010","0110","0101","1001"
9025 DATA "1000","1100","1101","
1001","1110","0101","0001"
9026 DATA "0100","0101","0101","
0101","1101","0101","0001"
9030 DIM o$(10,11): FOR n=1 TO 1
0: READ o$(n): NEXT n: DATA "swo
rd","shield","axe","torch","tind
er box","key","ring","sceptre","
book","magic sword"
9040 DIM b(9): FOR n=1 TO 9: REA
D b(n): NEXT n: DATA 4,4,2,5,4,4
,12,4,4
9050 DIM p$(9,8): FOR n=1 TO 9:
READ p$(n): NEXT n: DATA "skelet
on","guard","bat","spider","magi
cian","wizard","balrog","lord","
wyvern"
9060 DIM c$(8,5): FOR n=1 TO 8:
READ c$(n): NEXT n: DATA "light"
,"unlit","give","say","read","he
lp","open","close"
9499 RETURN
9500 REM **Instructions*********
9505 CLS : GO SUB 8600
9510 PRINT AT 3,0;"In a dark pla
ce in Middle Earth,Morbihan stan
ds the castle of   the Lord of D
arkness.          This half-spi
rit,half-human     creature want
s to take over the world."
9515 PRINT "The kings of the sur
rounding     countries have alrea
dy tried to defeat him, but thei
r armies arenot strong enough to
 battle withdark and evil magic.
"
9520 PRINT "So, the kings have d
ecided to    defeat the Lord in a
nother way. A very brave and cle
ver man has to break into the ca
stle and     kill the Lord."
9525 PRINT "You, the White Knigh
t, has to    perform this mission
."
9527 PRINT AT 21,0; FLASH 1;"Key
 Key Key Key Key Key Key Key "
9528 LET b$=INKEY$: IF b$="" THE
N  GO TO 9528
9530 CLS : PRINT "You start this
 adventure at the point where th
e White Knight hasjust entered t
he castle through a secret passa
geway."
9531 PRINT ''"You always see a gr
aphical        representation of t
he room, plusall the objects and
 persons      present in this roo
m."
9532 PRINT ''"At the right of the
 screen,thereis always informati
on about the objects you're carr
ying,your      life energy and you
r action      points."
9533 PRINT ''"At the bottom of th
e screen      appear the messages
 which informyou about your acti
ons and aboutthe actions of the
creatures youwill meet."
9534 PRINT AT 21,0; FLASH 1;"Key
 Key Key Key Key Key Key Key "
9535 LET b$=INKEY$: IF b$="" THE
N  GO TO 9535
9540 CLS : PRINT "You can perfor
m actions by         pressing the f
irst letter of theword (see main
 menu).            The different
actions are:"
9541 PRINT ''"MOVE: You can move
the White      Knight around the r
oom, using     the cursor keys.You
 can go to     other rooms by goin
g through      doors."
9542 PRINT ''"EXAMINE: You can ex
amine          anything in the roo
m, but not     the objects you're
carrying."
9543 PRINT ''"TAKE :This is obvio
us,I think..."
9544 PRINT ''"DROP :cfr. TAKE"
9545 PRINT AT 21,0; FLASH 1;"Key
 Key Key Key Key Key Key Key "
9546 LET b$=INKEY$: IF b$="" THE
N  GO TO 9546
9550 CLS : PRINT "FIGHT :You can
 fight with the    creatures you
meet.Altough you   will need the
help of some of    them... The mo
re weapons you     have,the stron
ger you are."
9551 PRINT ''"LEFT-RIGHT VIEW :Yo
u can rotate the room.Left means
 clockwise,  right anti-clockwis
e.All objectsand persons will ro
tate as well.This enables you to
 see the      'fourth' wall."
9552 PRINT ''"STOP :You stop the
action,The     other creatures wil
l now performtheir actions."
9553 PRINT ''"OTHER COMMAND :You
can enter anyother command,i.e.
open door,     give knife to guard
, help, say  hello...etc..."
9555 PRINT AT 21,0; FLASH 1;"Key
 Key Key Key Key Key Key Key "
9557 LET b$=INKEY$: IF b$="" THE
N  GO TO 9557
9560 CLS : PRINT "At the beginni
ng of the game youget a certain
amount of life      energy.This re
presents your       phisical condi
tion.When your      life energy le
vel rates zero,     you're dead an
d the game is over"
9561 PRINT "At the beginning of
each 'turn' you get action point
s.Each time you perform an actio
n,you lose   some action points.Y
ou can        perform actions unti
ll you enterthe command STOP, or
 untill youraction points fall b
elow -10.In this case a STOP com
mand is       executed automatical
ly."
9562 PRINT "The action points yo
u get are    proportional to your
 life energyWhen you enter STOP,
the              remaining action poi
nts are          added to your life e
nergy,           positive or negative
.You can         also lose life energ
y in combat."
9563 PRINT #0; FLASH 1;"Key Key
Key Key Key Key Key Key "
9564 LET b$=INKEY$: IF b$="" THE
N  GO TO 9564
9570 RETURN
```

CROSSWIRES

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Calculating

Dear Sir,

Q *Please could you shed some light on the RST28 instruction which Toni Baker mentioned in her Light Screen Designer article part 7. I understand that this instruction engages the Spectrum calculator and then the following instructions are interpreted as maths instructions.*

I cannot find any reference to them in the back of the Spectrum manual and would appreciate some help with this as I am very interested in machine code programming and think this could solve the problem of performing maths.

C. Duckett.

A As with everything in machine code, this is not quite as simple as it appears at first. The calculator's routines make use of its own stack and all operations are performed with reference to it. Numbers to be operated on need to be put on this stack in the correct sequence, which is easy when performing one calculation but needs careful organisation when many calculations are required.

The first thing is that the stacking of a number will destroy the register values, so as an example, let's say we want to multiply five and four and square the result. After PUSHing BC, DE and HL we load A with four (3E04) and call the routine to put this on the calculator stack at 2D28h (CD282D). Then load A with five and put that on the calculator stack. Now get back (POP) the BC, DE and HL values. The stacking routine is used to put the number held in A onto the stack. When a calculator routine is used it will get the values it requires from the stack, perform the operation and put the result back onto the stack. This means it will look for two values for operations such as add, subtract, multiply etc. and one for Square etc.

Once all the values that we need to perform the maths are on the stack *in the right order* then we can call the calculator RST28. Follow this with the code for multiply (04) and four and five are taken from the stack, multiplied, and the result (20) put onto the stack. Our next code is 31, this duplicates the last stack number, it now contains 20 and 20 so another multiply instruction, 04, will complete the calculation. To escape you must use 38 to tell the computer to end the calculator routines. The result can be read from the top of the calculator stack given by Peeking the address 23653/4 - 1.

To go into full detail is a series at least and I would certainly recommend that you purchase a good book. Toni Baker herself has written one and Dr. Ian Logan's is quite detailed. Many authors tend to skip this subject due to its complexity so I would suggest that you have a good browse before buying, check also that they have written it in terms which you can grasp.

Note for musicians

Dear Sir,

Q *I wrote a letter a few weeks ago asking why a program published in your mag called 'The Sound of Music' wouldn't work with my ZONX unit. Since then I have found that the instructions at addresses FAE0, FAE4, FB77, FB7B, FC0F, FC13, FC2B, FC30, FC36, FC3A need to be changed to OUT 255 and OUT 127 (for OUT 221 and OUT 223).*

The Fuller codes are OUT 63 and OUT 95 and the ZXM codes are OUT 159 and OUT 223.

Congratulations on a superb utility, I have been waiting for a long time for this one, eat your heart out MIDI!

Mr. F.G. Jay.

A Thank you very much Mr. Jay, we have had several queries about this and I was a bit at a loss as I haven't got any of these units with which to check out the program. It seems that any problems will be down to the addresses mentioned and you will need to check your instructions to ascertain which port codes to use there.

Protection

We have many letters from readers concerned about protecting their programs, Tim Ellis is one and asks for some POKEs to help him. I suggest POKE 23613,255 or POKE 23659,0 or even both. The first resets on an error report and the second crashes on an error or even an input command.

Here is a little system of my own: first I set up the machine code program by incorporating the following program in a pre-loader.

```
10 CLEAR 65099: FOR 1=65100 TO 65105:READ a:POKE 1,a:NEXT 1
20 DATA 33,61,92,54,255,201
```

Now you can either RANDOMIZE USR 65100 from the pre-loader or, as I prefer, put two or three lines in my main program doing this, usually the first line and at other selected points. It is also important to make the program auto run.

But what about those who MERGE the program and remove the Randomize code? Well this is virtually unavoidable but if before SAVING your program you type the line POKE (PEEK 23635+256*PEEK 23636+3),255 and then save it to auto-run using LINE 1, then a MERGE is not possible due to the computer thinking that the program is too long! The same technique can be applied to the loader program for maximum security.

Key to the problem?

Another favourite question of readers this month is asking how to get an input prompt in machine code. The following routine will provide what they require:

```
CALL key_scan (CD8E02)
LD C, 0 (0E00)
JR NZ, start (20F9)
CALL key_test (CD1E03)
JR NC, start (30F4)
DEC D (15)
LD E, A (5F)
CALL key_code (CD3303)
```

And the character code should be in the A register. It is wise to preserve the registers before using this routine.

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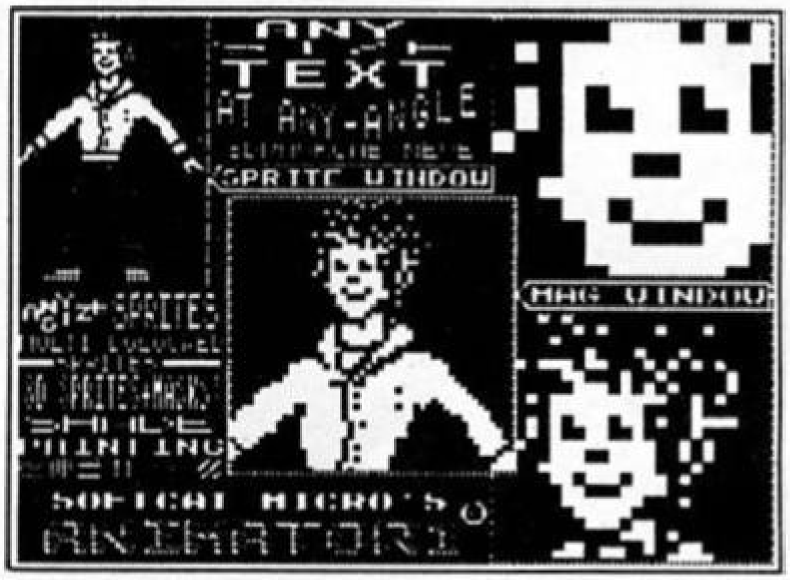
RE-DESIGNABLE BRUSHES/AIRBRUSHES & HATCHES; FAST TAG & FIXED LINE & CIRCLE MODES (all elastic); AMAZING SHADE PAINT CAPABILITIES (allows you to paint (and erase!) with shading (just the job for 3D work!)); FAST HATCH FILL WITH VERY FAST RE-HATCH (and you can re-design hatches in mid fill!); INDEPENDENT WALK-OVER COLOUR CONTROL (allows you to BRIGHTEN up your graphics without affecting the PAPER/INK or FLASH status etc.); RIDICULOUSLY POWERFUL PRINT FACILITY (allows you to PRINT any size/any shape/anywhere and at any angle (even backwards) over and over again with the same string or graphics (certain companies market less powerful print utilities as a complete package!); STRETCH & COMPRESS THE WHOLE SCREEN (from –100% to +100% horizontally and vertically); MAGNIFICATION WINDOW (allows you to see both real and magnified images as you work!); 25 SCROLLS/ROTATES & MIRRORS (YES 25! and they're all accessed instantly on the curser keys!); SAVE/LOAD/CAT/LCAT/ERASE & COPY – MICRODRIVE/DISC/TAPE – SCREENS/SPRITES/CHARACTER SETS/UDGs/BRUSHES/AIRBRUSHES & HATCHES. (Machine code programmers will be pleased to know that sprites, graphics and screens can be saved as LINES or CHARACTER SQUARES!); TO DEVELOP YOUR SPRITES YOU HAVE 15k OF MEMORY (the number of sprites depends on their size (up to 255 max). Everything's fully automated – you can STORE/RETRIEVE/ANIMATE (any consecutive sprites at any speed including single stepping)/and CHANGE the size and shape.

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DEALER ENQUIRIES WELCOME

Realms of Interaction

Alan Davis, author of Firebird's 'Runestone', begins a new series showing you how to create a world full of independent characters.

Ask a seasoned adventure player to describe the qualities of a good adventure, and you're likely to find the word 'atmosphere' high on his list of priorities. In other words, a good adventure should (among other things) create the illusion that the player is exploring a world which, though imaginary, seems tangible and real. It should be easy for the player to forget that he is, after all, dealing only with a computer program. Certainly the best traditional adventures go a long way towards achieving this in some respects. Level 9 games are renowned for their detailed, well-written text descriptions, and the arrival of The Quill a couple of years ago has resulted in a vast number of traditional text adventures — some of them excellent. You could well argue that the adventure player has never had it so good — and of course in some sense, you'd be right.

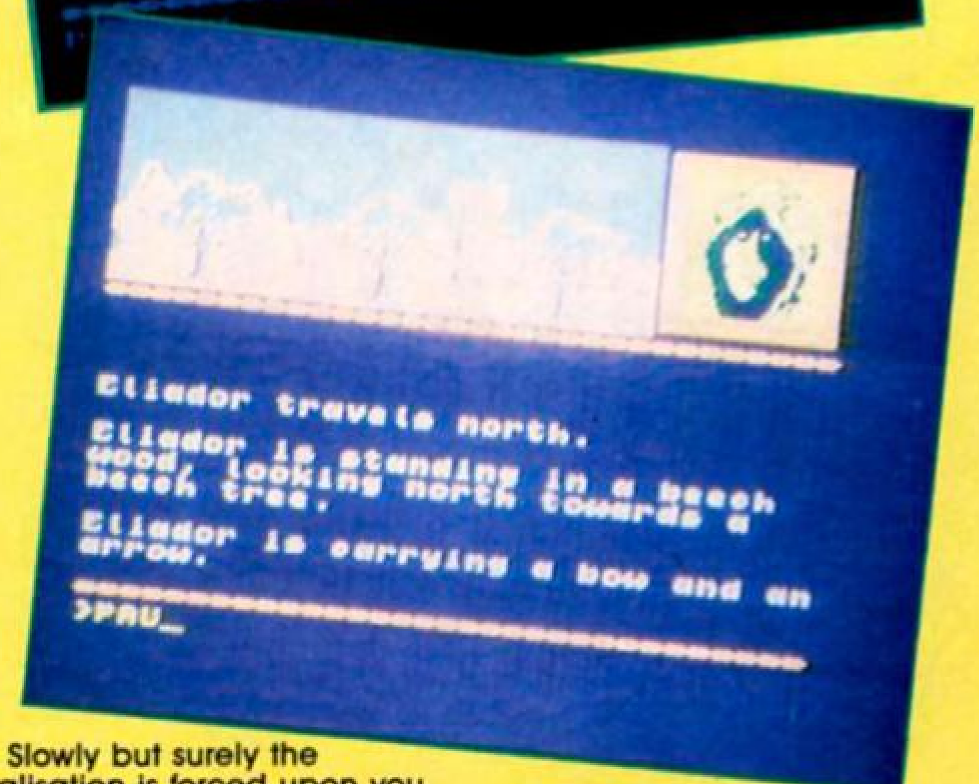
The classic adventure game invariably takes the form of an intricate series of puzzles, set within the framework of an imaginary world. Essentially, the puzzles make the game — and if it's puzzles you want, then the world's your oyster. If, on the other hand, you value adventures more for their atmosphere than for their puzzles — for the thrill of exploring a strange and exciting world — then all may not be quite so well.

Let's take an example: you're wandering along a dark, damp passageway, and turn a corner to find your way blocked by a troll. Hmmm. Try talking to it. Silence. Give it the gold coin? "You can't" comes the not so helpful reply. Frustration sets in — clobber it with your axe. "You can't".









Runestone

Slowly but surely the realisation is forced upon you that this is no troll. It's just another puzzle set by the programmer. It sits there, a part of the scenery, until you come up with the correct response. Now an avid puzzle solver doesn't mind this, by now he's well hooked on the sequence of puzzles and simply wants to solve them. But, alas for the seeker after thrills and exploration, he's just had all his illusions shattered.

Still life

It remains a source of astonishment to me that among the hundreds of adventure games available, so few have attempted to tackle the problem of 'lifeless' characters. So few, in fact, that one could probably list them all in a couple of lines: Hobbit, Sherlock, Lord of the Rings, Valhalla, Fantasia Diamond, Kentilla . . . I may have missed one or two, but apart from my own Runestone there can't be many more (for the Spectrum, at any rate). What these few games have in common (with varying degrees of success, it must be admitted) is the aim of convincing the player that the world in which he finds himself is *already* inhabited, that life is going on there whether the player is present or not. Undoubtedly they have their limitations, but games of this type create an atmosphere of vitality which is almost totally lacking in most traditional adventures. Oddly enough, many experienced adventurers tend to regard these games with suspicion, or even dislike, often on the grounds that the independent behaviour of the characters interferes with the serious business of puzzle-solving. Again, it all comes down to what you want from your adventure playing, but it's been my steadily growing belief that intelligent independent characters are almost essential to an adventure if the game is to be a satisfying imaginative experience and not just an intellectual one. Which brings us, at last, to the tricky question — "How is it done?"

Adventure games have always offered considerable scope to the BASIC programmer. Many fine programs have been written entirely in BASIC simply because speed of response (up to a point) isn't a major consideration. But the moment we try to introduce independent characters, the situation changes. The program has to process not just the player's one set of actions, but several. In Runestone there are about 40 characters and the program has to look after each one. BASIC would be impossibly slow for this kind of job, but despite this it really isn't so difficult to write independent characters into your adventure programs, and the result makes the effort well worthwhile. There are two main points to bear in mind.

1) It's essential that we give our characters some semblance of intelligence (however limited) to make it as easy as possible for the player to 'suspend disbelief'. We might for example, program them to recognise and address each other by name, or to adapt their conversation to suit changing circumstances. However we approach the problem, we must create the illusion that they are behaving in a purposeful way.
2) We need to identify those parts of the program which would be unacceptably slow in BASIC, and inject machine code routines where necessary.

D.I.Y.

Things to come

In this series of articles, we'll look at the various ways in which these things can be achieved, rooting out the problems involved, and finding flexible programming solutions which you can adapt for use in your own games. In fact, let's make a start this month by solving one simple (but essential) problem. It's an inevitable fact that in any program which contains independent characters, we simply do not know in advance exactly what any given character will say or do at any given time. This means that we can get nowhere at all without a thoroughly flexible method of printing text to the screen, word-wrapping at the ends of lines as necessary. Listing 1 gives an assembly language program which will do just that, and we shall make heavy use of this routine in future. If you don't have an assembler program (go on, treat yourself!) then the BASIC program in Listing 2 will POKE the code into memory, check for errors, SAVE it to tape, and test it.

Lines 80 and 90 of Listing 2 show how the routine is used. Simply build up your text from BASIC in the variable z$ and then **LET m = USR 64505.** There are three points about this routine which you need to be aware of:

1) It will deal only with strings up to a maximum of 255 characters in length. This is ample for our present purpose, but if you use the routine elsewhere you may need to print up your string in several parts to avoid problems.
2) POKE 64500,1 will cause the text to be sent, line by line, to the printer as well as the screen (ZX-type printer, that is). POKE 64500,0 turns the printer off.
3) As it stands, the text is printed to line 20 on the screen and scrolled upwards. If you want printing to start at some other line, then POKE 64658, (line number) will do the trick.

This, of course, is just a taster to scratch the itch in those finger-ends. Next month we'll start to build a world in earnest.

```
*HISOFT GENS3M2 ASSEMBLER*
      ZX SPECTRUM

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Pass 1 errors: 00

           10 *C-
FBF4       20              ORG   64500
5C4B       30 VARS         EQU   #5C4B
19B8       40 SEARCH       EQU   #19B8
0DFE       50 SCR          EQU   #0DFE
FBF4       60 HARD         DEFB  0
FBF5       70 LEN          DEFB  0
FBF6       80 STEP         DEFB  0
FBF7       90 STRT         DEFW  0
FBF9      100              LD    HL,(VARS)
FBFC      110 NEXT         LD    A,(HL)
FBFD      120              CP    90
FBFF      130              JP    Z,FOUND
FC02      140              CALL  SEARCH
FC05      150              EX    DE,HL
FC06      160              JP    NEXT
FC09      170 FOUND        INC   HL
FC0A      180              LD    A,(HL)
FC0B      190              LD    (LEN),A
FC0E      200              INC   HL
FC0F      210              INC   HL
FC10      220              LD    (STRT),HL
FC13      230 SCAN         CALL  CHECK
FC16      240              CP    1
FC18      250              JP    Z,PRINT
FC1B      260              CALL  CHOP
FC1E      270              CALL  PRINT
FC21      280              LD    HL,(STRT)
FC24      290              LD    DE,(STEP)
FC28      300              LD    D,0
FC2A      310              ADD   HL,DE
FC2B      320              LD    (STRT),HL
FC2E      330              LD    A,(STEP)
FC31      340              LD    B,A
FC32      350              LD    A,(LEN)
FC35      360              SUB   B
FC36      370              LD    (LEN),A
FC39      380 REPT         LD    HL,(STRT)
FC3C      390              LD    A,(HL)
FC3D      400              CP    32
FC3F      410              JP    NZ,SCAN
FC42      420              INC   HL
FC43      430              LD    (STRT),HL
FC46      440              LD    A,(LEN)
FC49      450              DEC   A
FC4A      460              LD    (LEN),A
FC4D      470              JP    REPT
FC50      480 CHECK        LD    A,(LEN)
FC53      490              CP    33
FC55      500              JP    C,SHORT
FC58      510              XOR   A
FC59      520              RET
FC5A      530 SHORT        LD    A,(LEN)
FC5D      540              LD    (STEP),A
FC60      550              LD    A,1
FC62      560              RET
FC63      570 CHOP         LD    HL,(STRT)
FC66      580              LD    DE,31
FC69      590              ADD   HL,DE
FC6A      600 LOOP         LD    A,(HL)
FC6B      610              CP    31
FC6D      620              JP    NC,SPACE
FC70      630 END          INC   DE
FC71      640              LD    A,E
FC72      650              LD    (STEP),A
FC75      660              RET
FC76      670 SPACE        INC   HL
FC77      680              LD    A,(HL)
FC78      690              CP    32
FC7A      700              JP    NZ,DECR
FC7D      710              JP    END
FC80      720 DECR         DEC   DE
FC81      730              DEC   HL
FC82      740              DEC   HL
FC83      750              JP    LOOP
FC86      760 PRINT        CALL  SCR
FC89      770              LD    A,2
FC8B      780              CALL  #1601
FC8E      790              LD    A,#16
FC90      800              RST   #10
FC91      810              LD    A,20
FC93      820              RST   #10
FC94      830              XOR   A
FC95      840              RST   #10
FC96      850              LD    DE,(STRT)
FC9A      860              LD    BC,(STEP)
FC9E      870              LD    B,0
FCA0      880              CALL  #203C
FCA3      890              LD    A,(HARD)
FCA6      900              CP    1
FCA8      910              RET   NZ
FCA9      920              LD    A,3
FCAB      930              CALL  #1601
FCAE      940              LD    DE,(STRT)
FCB2      950              LD    BC,(STEP)
FCB6      960              LD    B,0
FCB8      970              CALL  #203C
FCBB      980              LD    A,13
FCBD      990              RST   #10
FCBE     1000              RET

Pass 2 errors: 00

CHECK   FC50     CHOP    FC63
DECR    FC80     END     FC70
FOUND   FC09     HARD    FBF4
LEN     FBF5     LOOP    FC6A
NEXT    FBFC     PRINT   FC86
REPT    FC39     SCAN    FC13
SCR     0DFE     SEARCH  19B8
SHORT   FC5A     SPACE   FC76
STEP    FBF6     STRT    FBF7
VARS    5C4B

Table used:   226  from   260
```

Listing 1. Assembly Language program.



```
  5 REM *** BASIC loader for
            z$print routine
       ***
 10 CLEAR 64499: LET s=0
 20 FOR i=64500 TO 64702
 30 READ x: POKE i,x: LET s=s+x
 40 NEXT i
 50 IF s<>29080 THEN PRINT "Err
or!!": STOP
 60 SAVE "z$print"CODE 64500,20
3
 70 PRINT #1;AT 0,0;"Press a ke
y to test routine.": PAUSE 0: CL
S
 80 LET z$="": FOR i=1 TO 3: LE
T z$=z$+" The Owl and the Pussyc
at went to sea in a beautiful pe
a-green boat.": NEXT i
 90 LET m=USR 64505
100 DATA 0,0,0,0,0,42,75,92,126
,254
110 DATA 90,202,9,252,205,184,2
5,235,195,252
120 DATA 251,35,126,50,245,251,
35,35,34,247
130 DATA 251,205,80,252,254,1,2
02,134,252,205
140 DATA 99,252,205,134,252,42,
247,251,237,91
150 DATA 246,251,22,0,25,34,247
,251,58,246
160 DATA 251,71,58,245,251,144,
50,245,251,42
170 DATA 247,251,126,254,32,194
,19,252,35,34
180 DATA 247,251,58,245,251,61,
50,245,251,195
190 DATA 57,252,58,245,251,254,
33,218,90,252
200 DATA 175,201,58,245,251,50,
246,251,62,1
210 DATA 201,42,247,251,17,31,0
,25,126,254
220 DATA 31,210,118,252,19,123,
50,246,251,201
230 DATA 35,126,254,32,194,128,
252,195,112,252
240 DATA 27,43,43,195,106,252,2
05,254,13,62
250 DATA 2,205,1,22,62,22,215,6
2,20,215
260 DATA 175,215,237,91,247,251
,237,75,246,251
270 DATA 6,0,205,60,32,58,244,2
51,254,1
280 DATA 192,62,3,205,1,22,237,
91,247,251
290 DATA 237,75,246,251,6,0,205
,60,32,62
300 DATA 13,215,201
```

Listing 2. Basic listing to POKE the m/c into memory.

SCREENMASTERS

SCREENMASTER 1 and 2

Simtron
£4.50 each

Simtron software specialise in what they call 'programs to help you' — their previous offering being the Car Cure diagnostic program. But now Simtron have embarked on something a little less obscure with the Screenmaster family of graphics utilities.

At the moment only Screenmaster 1 and 2 are near completion (though SM3 is under development with further programs in the series planned) and Simtron let us have an early look at the two programs.

Screenmaster 1 came as a bit of a surprise as it's a character generator — the sort of thing that I haven't seen sold as a separate program for ages. Most graphics utilities include UDG and sprite generators as standard these days so perhaps there's not really much call for programs which do that and nothing else.

SM1 has three options, allowing you to create either UDGs, Sprites (measuring two by two character squares), or what they call Pictels, which are small pictures four characters high by four wide. All these are created by the standard method of plotting squares on a magnified grid, and can be Saved/Loaded as necessary. The program also includes an animation routine which allows you to animate groups of sprites in order to see how they look 'in action'. Simtron tell us that they may also add a routine for rotating sprites.

As a character generator it functions perfectly well, but it's not a very ambitious program and doesn't do anything that many other programs don't already do. The only real advantage in buying SM1 rather than a graphics package which includes its own UDG/sprite facilities is that it's considerably cheaper, but of course you don't get the added screen design facilities unless you also buy Screenmaster 2.

SM2 is a more ambitious program and offers a whole range of options allowing you to create full screen pictures. All the usual features are included, Fill and Brush with various patterns, Circle and Box, and also commands for drawing ovals, ellipses and a variety of polygons which I don't remember seeing in any similar packages. In the unfinished version of the program these seem rather slow, though they will be considerably faster when finished. Simon Wright stressed that the Screenmaster programs are intended not just to act as utilities, but also to allow the user to see how the programs work, giving them an idea of the programming involved. As a result some sections of the finished program may be left in Basic, which may well affect the speed of the routines. On the other hand, routines such as Fill which are fully machine coded do work quickly.

Both programs will be available separately, though they can also be bought together for the special price of £7.95. So far, SM2 seems to be shaping up quite well, and with luck we'll have a completed copy of the program in time for a full review in the next issue.

FOUR FOR THE FILES

Here at ZXC we try not to take anything at face value (unless it's free) and this set of software made us glad we don't. When it arrived it didn't create much of a stir; four computer tapes with typewritten labels on them plus four small 'booklets' consisting of dot matrix printed sheets stapled together and a brief letter inviting our "honest opinion".

The four programs are all filing programs and are essentially all based around the same screen format, search and menu displays. Three of them are intended as specific programs for filing details of Magazines, Films and Discs (the musical variety) and the fourth, Speedfile, is intended to be an all purpose file system.

All four are well laid out and easy to use, the menus are clearly displayed and as many single key inputs as possible are used. Colour is used to good effect and record display for the first three programs follows the same pattern, 'film' and 'disc' displaying three records per page and 'magazine' two. These three are very similar and all feature the following options:

I - Input a new record.
L - List all records, with the facility to delete a record or send a page to printer. Otpion for 80 col. printer is included.
S - Search for series of characters.
F - File Status.
C - Save/Load options (Microdrive is supported).
T - Sort by selected field (Magazine and Disc only).

The individual differences are as follows, numbers in brackets are the characters allowed for each field: MAGAZINE. This has six fields labelled Magazine Article (27), Magazine (24), Volume (3), Number (2), Date (8), Page (3).

DISC: There are only three fields, Title (27), Artist (20) and Ref. No. (6).

FILM consists of four fields, Film Title (27), Medium (10), Year (4) and rating (2).

The search option works on all fields except for Magazine and Medium. These are slightly different as they are selected and entered from an option menu, magazine allows you to keep up to 20 operator-selected magazine names on file and a separate search is provided for it. Each of these programs is around 5K in length and they are pure machine code which makes the search and sort operations very fast and efficient.

There is enough room on each program for approximately 1000 records which is a respectable number for home use, and some small businesses could also consider them. My only criticism is that the formats are unalterable, but in most cases there is enough room provided — you may have to abbreviate "Frankie Goes To Hollywood" though! Also I would have liked to have had a facility for making notes.

Speedfile

This is the master program of the set but it is the one which I found most disappointing. All the same options provided for the other files are provided except that there is only one field which may be up to 250 characters long. There is no option to set the number of fields, length, position or headings. The only provision is the use of ! as a new line indicator. With a bit of fiddling some screen formatting is feasible, but it isn't easy.

Probably if you want to keep a simple list or perhaps an address book on your computer then this would provide an acceptable means of doing so. However, if you are after the flexibility that a program of this type should provide then perhaps a more expensive program such as Masterfile by Campbell Systems would be better.

For ease of use and the options available I was reasonably impressed. If you want a program to keep simple details of your Magazine or Disc or Film collection on your Spectrum without too much fuss then they can be highly recommended. However if you want to keep three or more different types of file then I think you would be better off buying an all purpose program such as Masterfile or Sinclair's own VU-File and taking the time to learn to set it up yourself.

One very good feature was the way in which the program operated my printer — via a ZX Lprint interface — in both screen copy and 80 characters per line list mode. As long as I initialised it before loading a program it worked perfectly, and if I forgot then I simply went into the SAVE option, broke out of the program, initialised the printer and restarted the program without any difficulty.

Because the program Saves and Loads from within the machine code, it is difficult to customise it to work with other storage media, the Wafadrive for example. I was able to use them on the Technology Research Disk drive due to the RAM save feature, but otherwise you'll have to keep the data on tape. My daughter has adopted the Disc program, my son has borrowed the Film one and I have started getting all those articles in back issues of ZXC (and other) magazines organised with the Magazine program.

The programs are marketed by DGF Software, 7 Rushlade Close, Paignton, Devon, TQ4 7BZ and sell at £5.90 each including P&P.



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5. Breakout	22. Cars	40. Voyager
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7. Startrek	24. Pinball	42. Blitz
8. Martian Knockout	25. Cavern	43. Fishing Mission
	26. Laser	44. Mystical Diamonds
9. Boggles	27. Alien	
10. Alien Attack	28. Cargo	45. Galaxy Defence
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12. Maze Eater	30. The Skull	47. Jetmobile
13. Microtrap	31. Orbit	48. Barrel Jump
14. Motorway	32. Munch	49. Attacker
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Crossfire is here to express your views and opinions on Sinclair computing matters. We want to hear from you about the delights of computing as well as the problems.



Uploading — The French Connection

This letter is in response to those who have written to ZX asking if there is software to up-load ZX81 programs to the Spectrum. I hope the following information will be of some help.

Ere Informatique, Paris, France has a program called ZX Trans which claims to up-load to the 16K or 48K Spectrum any program designed to run on the ZX81. The cost of this program is under 1000 francs. Although I do not have this program and cannot vouch for it anyone who is interested the address is Ere Informatique, 27 Rue de Leningrad, 75008, Paris, France.

Another program, called First Load has been published in the American periodical, Syntax. It is a machine code program written by David Ornstein to upload Timex/Sinclair (ZX81) programs to the Timex Sinclair 2068. I have used this program satisfactorily on the TS2068. Although there are limitations for long programs in ZX81 Basic it saves a lot of the dog work need to re-key from scratch.

David Solly, Ontario, Canada.

Sinclair in Germany

I bought a secondhand Spectrum and Microdrive three weeks ago but people told me Sinclair had died in Germany. Can you help me with some names and addresses?

Where can I still get accessories? Do you know of any user groups?

J. Werthe, Oldenburg, Germany.

Graphics explained

We do receive occasional enquiries from readers about the system of Spectrum graphics used in ZX listings. Especially for our new readers, Ray Elder explains our method.

There are three ways of producing graphics on the Spectrum and the method by PLOT and DRAW needs no special instructions, all plot and draw commands are simple text and do not confuse our printer.

The second method is to use the "block" graphics built into the Spectrum character set. These are found on keys 1 to 8. When these are printed then the shape is reproduced in the listing. It may cause a few moments finding the correct shape, but at the end you have an accurate printed copy to compare your efforts with. To use these graphics go into "graphics mode' by holding down the CAPS SHIFT key and pressing the "9" key. The cursor should show a flashing G. Now by pressing any of keys 1 to 8 you should get the graphics shown on them. But thats not all, the inverse or opposite of these characters can be obtained by holding down the CAPS SHIFT before pressing the number key.

The third and last way of producing graphics is by UDG's, User Defined Graphics. These are an extension of the graphics on keys 1 to 8 and are alterable by us to form whatever shape we require. They are accessed from graphics mode as before (CAPS SHIFT'S) but are found on letter keys A to U, what has often confused readers is that in their natural state they are identical to the capital letters A to U!

When the program is run, however, then they are redefined to the shape required. We used to print programs with the UDGs in their redefined form and readers in their millions asked what the strange characters were. A relative few worked out that if they just ran the UDG define section of the program first, usually the bit with a USR "a" TO USR, then they could compare graphics with the printed ones. But of course their odd error in the UDG data upset that!

So we devised a method where the UDG graphics are printed in their original letter form except that they are underlined to distinguish them from ordinary letters, and we usually print a line 1 REM to remind typists of this.

Now having said all that I do admit to the occasional error having crept in, Gold, for instance, lost all its graphics. Our printer reset and I omitted to switch on the graphics function before LListing. Are we the only ones left in the computer dominated society to claim HUMAN error?

Clubs

The Australian ZX Users' Association, The OLDEST Sinclair users club down under publishes a bi-monthly magazine and caters for users of all Sinclair computers. Contact David Vernon, 15 Waller Court, Cambell, 2601 A.C.T.

A call to Sinclair confirms that they are still a force in Germany. Their official distributor is J. Schumpich, Jagerweg 10, Postsach 6352, West Germany.

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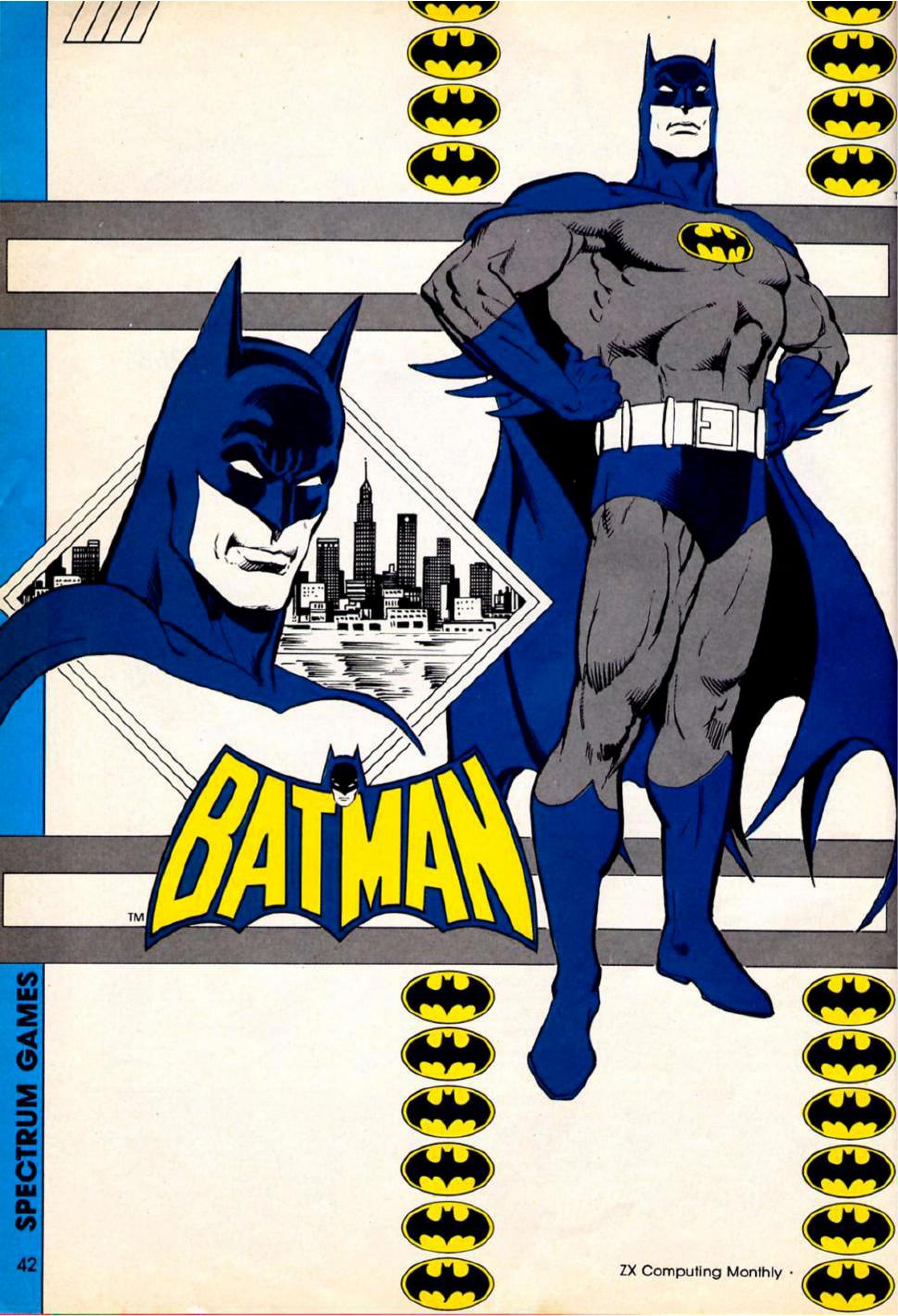
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BATMAN
TM

Great jumping licensing deals! The Caped Crusader bursts onto the Spectrum.

BATMAN

Ocean
£7.95

Believe it or not, Ocean have actually finished a game before they've started advertising it (although it's possible that ads may have appeared before you read this review). Not only that, but it's a good one too.

When I heard that Ocean had done a deal to produce a Batman game I was worried that it might end up like the Superman game — highly hyped on the strength of the well known characters, but an awful game. Comic buffs might have been hoping for a game based on the serious Batman strip of the 70s but Ocean have chosen to capture the lighter spirit of the 60s TV series, which is probably a good decision as this is perhaps more suited to a computer game.

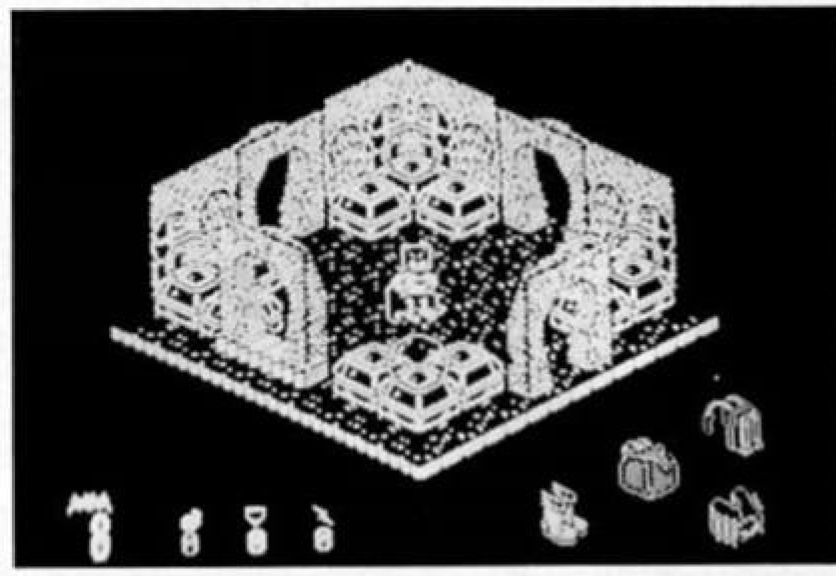
The instructions tell you that Robin The Boy Blunder has gone and gotten himself kidnapped, so our hero, The Caped Crusader, has to dash off and rescue him. But before he can race to the rescue Batman has to gather together all his Bat-equipment and assemble the parts of the Batmobile that Robin left lying around the Batcave.

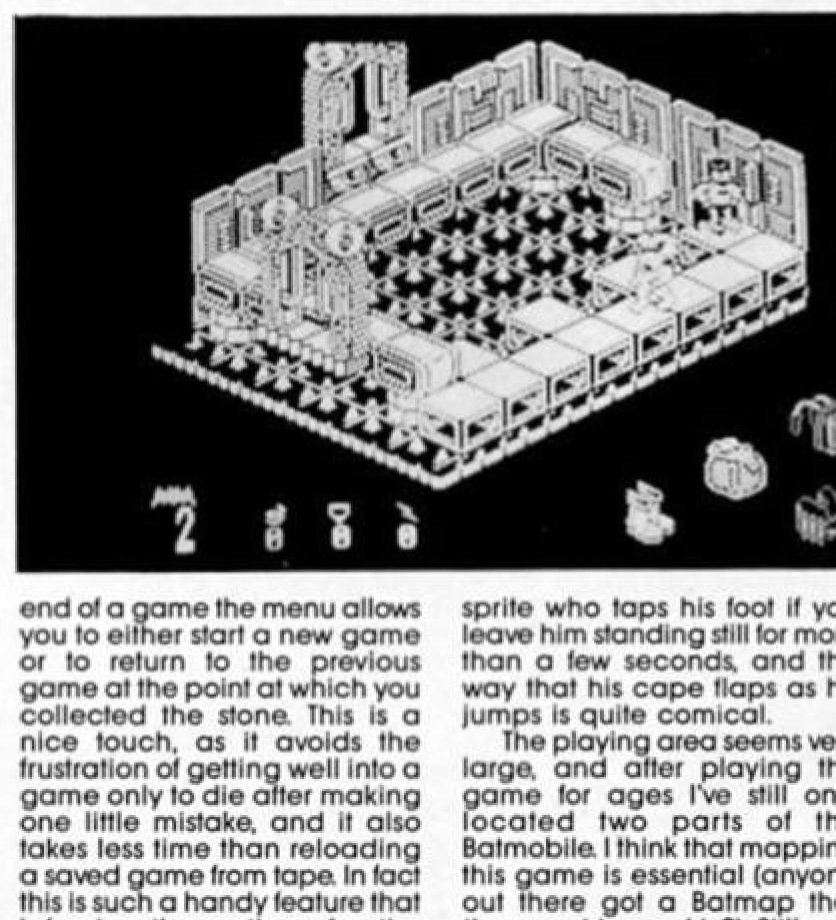
If the Batcave looks at all familiar that's probably because it bears an uncanny resemblance to the space ship in Ultimate's Alien 8. Fortunately this game has enough style of its own to fend off charges of being a simple rip-off. The Batcave is full of obstacles and deadly creatures which stand between Batman and the completed Batmobile, and the problems that you'll have to solve are challenging enough to keep you occupied for quite a while. As with most games of this type you are able to pick up and carry a number of objects that will help you find your way past obstacles. But unlike some games, here you cannot carry objects from one location to the next which means that often the only things that can help you are just the few objects that you can see in a particular location.

The usual deadly paraphenalia for this type of game is present; conveyor belts that drop you onto piles of spikes, stepping stones that vanish as soon as you touch them, and there are some rooms where only specific objects or the effects of Batpills will get you through.

Scattered around the cave in order to help you out are the 'Bat-objects', these include Batboots, Batbag, Batbelt and Batthruster. The Batbag is needed before you can carry any other objects, and the Batboots allow you to jump — until you find these you can only walk along the floor — so finding these really has to be your first task. The other two pieces of equipment supplement your jumping powers and allow you to reach certain objects which are otherwise unreachable.

Also hidden in the Batcave are a number of Batpills (shaped like little Batmen) which have a variety of effects; they can boost your energy levels, make you invulnerable, increase your jumping ability and so on, and there are also a number of 'reincarnation stones'. These are interesting little items which provide you with a Save Game facility. At the end of a game the menu allows you to either start a new game or to return to the previous game at the point at which you collected the stone. This is a nice touch, as it avoids the frustration of getting well into a game only to die after making one little mistake, and it also takes less time than reloading a saved game from tape. In fact this is such a handy feature that I forgive the authors for the cumbersome method of defining keyboard controls that they use.





The graphics throughout are excellent. Obviously the 3D style is familiar from a number of games now, but a lot of attention to detail seem to have gone into this one and all the rooms and objects are very clearly drawn. Batman himself is an outrageously cute little sprite who taps his foot if you leave him standing still for more than a few seconds, and the way that his cape flaps as he jumps is quite comical.

The playing area seems very large, and after playing the game for ages I've still only located two parts of the Batmobile. I think that mapping this game is essential (anyone out there got a Batmap that they want to send in?). Still, you do get eight lives which allow you to experiment and get into the game without uneccesary frustration. I don't think that Batman will go down as a classic game — the Alien 8 similarities knock off a few points for originality — but it's one of those games that manages to take an established format and add a bit of character that makes it stand out from the crowd.



MONSTER HIT

QUESTPROBE

'HUMAN TORCH THING'



Here's your chance to join the super heroes with 50 copies of Questprobe, featuring The Human Torch and The Thing, to be won.

If you've been hiding your awesome competition entering powers, conceal them no longer as ZX and US Gold have got together to bring you Questprobe as a prize.

Questprobe puts you in control of not one but two Superheroes, The Human Torch and The Thing, who have been ordered by the Chief Examiner to save Alicia Masters from the clutches of the hideously evil Dr Doom.

The game was written by Scott Adams and will be appearing on US Gold's All American Adventures label. All you have to do to enter is answer two questions on the Fantastic Four.

The Questions

1) Name the two other super heroes who are in the Fantastic Four.
2) What are the real names of any two members of the Fantastic Four?

How to enter

Complete the entry coupon, printing clearly the answers and your name and address and send it to Questprobe Competition, ZX Computing Monthly, No 1 Golden Square, London W1R 3AB. Please write your answers clearly on the back of your envelope.

Rules

The competition is open to all readers of ZX Computing except employees of Argus Specialist Publications, US Gold and Alabaster Passmore. The editor's decision is final and no correspondence can be entered into.

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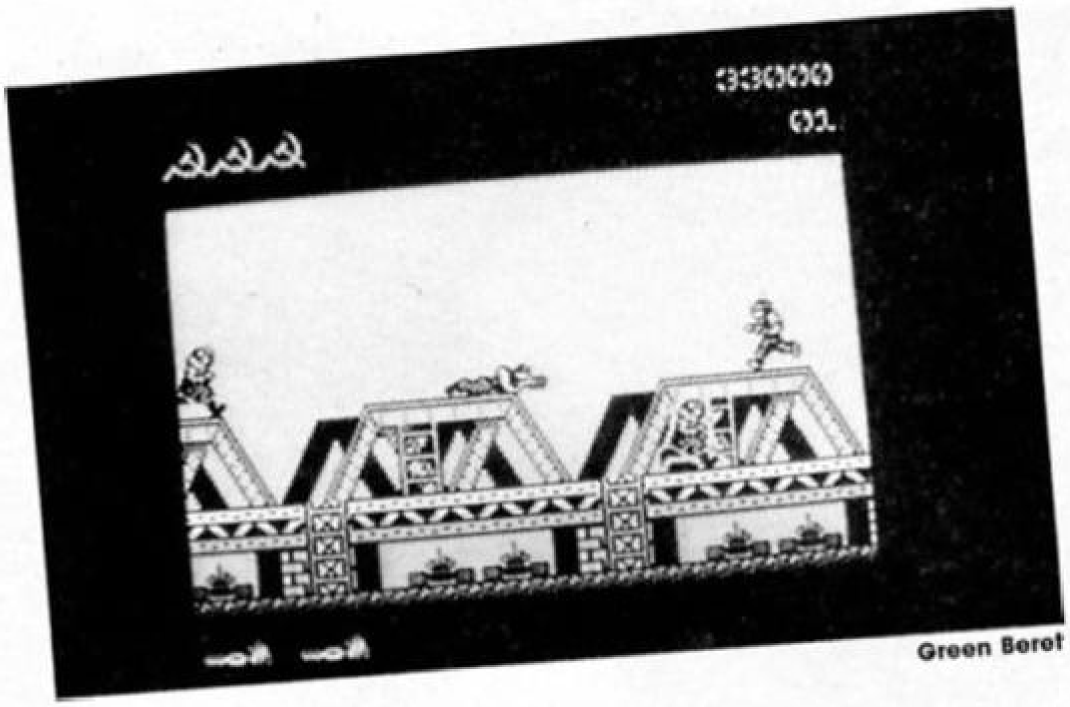
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Send this coupon to Questprobe Competition, ZX Computing Monthly, No 1 Golden Square, London W1R 3AB to arrive by first post Friday June 6th 1986. Remember also to print your answers clearly on the back of your envelope.

inside Ocean

Ocean have just transplanted their Manchester HQ to an unlikely setting. They are now sharing a building with the Quakers. Does this mean a new departure into religious computer games? ZX investigates.



Green Beret

Nobody would be happier than me if someone walked in here with a game they had been working on for six months in an attic and presented us with the next big computer game.

So said David Ward, chairman of Ocean. There was no knock on the door at that particular moment but even now that computer games are big business anonymous programmers can still rocket to overnight success.

Although the stream of amateur "attic" games of marketable quality is dwindling to a trickle there are still lofts in faraway places humming with inspiration. The story of Ocean's bestselling game Movie is a case in point. Dusko Dimitrijevic, a Yugoslav programmer, appeared on Ocean's doorstep one day having come to England for an appointment with another software house which folded just before his arrival. Referred to Ocean he showed them the game he had completed and, recognising his potential, he was given a brief to produce a game in a Sam Spade vein. Some time later a parcel with a Yugoslav postmark, containing Movie, dropped through Ocean's letterbox.

Of course you don't have to scour Eastern Europe for top programmers and in the basement of Ocean's offices can be found a team of in-house programmers assembling future releases. Paul Owen, who oversees the development of Spectrum games, gave us a guided tour of the cubicles sectioned off into banks of hardware devoted to the Spectrum and Commodore. Another room housed keyboards for writing music, while two other rooms concealed some secrets. One was the room devoted to clandestine software developments which was strictly off limits to all but programming personnel. The other, nicknamed the Socialist Room, was for purposes that could only be guessed at.

On the house

The average age of the in-house programmers is 19 and the qualities needed to succeed were summed up by Paul as being, "dedication, hard work and loyalty." "It's not all glamour being a programmer," he added.

One aspect of the Quakers' code of clean living seems to have rubbed off in that there's a total ban on alcohol on Ocean's premises. Paul explained that the reason for the ban was based on the need for efficiency. "Programming requires complete concentration, drink and coding just don't mix."

Upstairs in the spacious, white-walled offices, David Ward spoke of Ocean's past, present and future.

"Ocean started three years ago and like many companies we concentrated on mail order. It's interesting to see that there's a move back to mail order as software for the more obscure machines doesn't make it into the mainstream retailers anymore.

"We are also finding a big mail order demand for our IQ utilities range and it's nice in a way to have come full circle with people waiting with bated breath for the arrival of their jiffy bags."

David stressed that Ocean was set up as "a publishing company rather than a software house."

"We took the view that software was a form of home entertainment just like records and books and as a publisher we wanted to cast our net as wide as possible so as not to exclude any creative forces.

"We are in the business of manufacturing and selling and unlike some software houses that were set up to simply develop software we used our business acumen to sell into the high street stores. The software houses that simply wanted to develop games have been the casualties in the past few years."

Even though Ocean has its in-house programmers it still relies on outside programmers to provide much of the work and fresh ideas.

"I don't think we could ever claim to determine what the next thing in software is going to be. We've got perhaps 50 or 60 software



David Ward: Chairman of Ocean

writers dotted around the country and I think that software development like any other creative process depends on inspiration and writers need different sorts of working environments to be innovative.

"Nowadays of course, many games for home micros are developed on much bigger machines but I still feel that in most cases the best games for, say, the Spectrum are produced and written on the Spectrum.

"I think that Sinclair themselves have been surprised at the capabilities still being found on the 8-bit machine and its life expectancy will exceed the estimates of the critics."

Just Imagine

Unlike some expanding software houses Ocean have not adopted a policy of devouring other companies. The exception was the acquisition of Imagine.

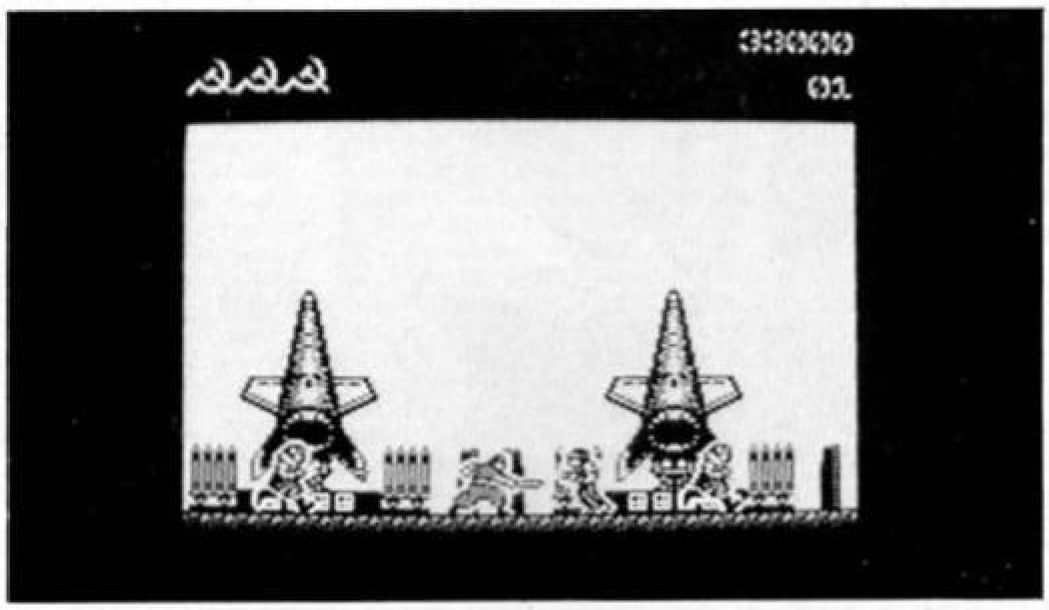
"We bought the rights to use the Imagine label and a couple of games like World Series Baseball which they were developing. Imagine was a well known name even if it was a notorious one and sales of Imagine games in Europe continued to hold up despite the changeover."

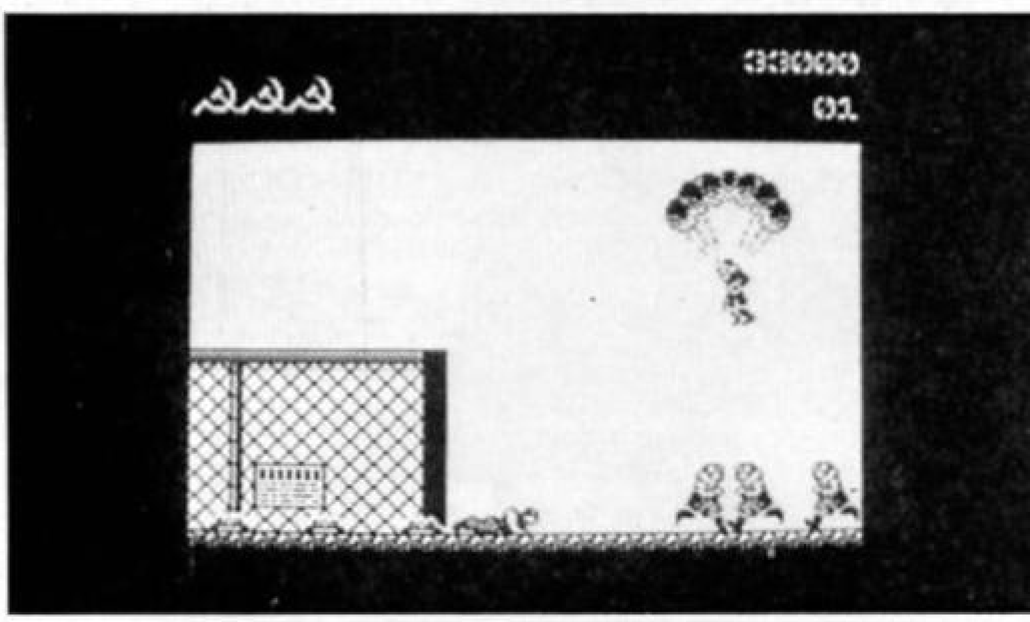
Imagine became the imprint devoted to arcade games, in particular conversions from Konami coin op games such as Yie Ar Kung Fu, Hypersports and the forthcoming Ping Pong.

Ocean have plans to create another imprint to put alongside, Imagine and the IQ series.

"We have some adventures in the Infocom mould for which we will need a separate label. What we try to do is create a brand to cater for a particular market. The last thing you want to do is dissapoint customers who have come to expect a certain type of game from a particular label.'"

When it comes to licensing deals there is no waiting around for tempting offers to materialise. Ocean have a string of successful spin off games including Rambo and the soon to be released V and Batman.





"Once we've got a licensing deal we have to find a team to put it together and the problem there is that unlike straight conversions there are a hundred different ways of doing it. We leave as much to the programmers as possible in determining the best treatment but the real constraints as always are the constraints of the target machine itself."

Even though the software industry seems to be evolving towards fewer and larger software companies, David believes there is still a chance for the independent small business to make it work.

"There is still room in the industry for a person to build a company on the strength of a single product."

While at Ocean we were given a sneak preview of Green Beret, another Konami conversion which carries the idea of "one man against an army" to new heights. In the basement there were various versions on show, the original Konami game running as a constant reference point, a virtually complete Commodore version and the graphics for the Spectrum game. With comparison made easy it's evident that little has been lost in the translation from the original to the Spectrum. All the game elements are present and only some colour detail has been dropped. Your task as a lone Green Beret is to rescue four prisoners from the heart of the enemy compound. The enemy is an anonymous Eastern bloc country although the hammer and sickle symbols on the screen may give you a slight clue.

Armed only with a knife, rifle and a flamethrower which you pick up along the way you are faced with guards, man eating dogs, gyrocopters dropping bombs from above, and yet more guards. If you are in the mood for a massacre Green Beret will offer you the chance of maximum decimation for your money.

READ ONLY

The book page returns as David Harwood takes a look at the latest offerings.



As ZX moves into the monthly magazine market place, we on the book page are moving into the space age. Evidence of this are the books on offer this month, dealing with hacking into the airwaves, Comets, and modern network systems.

The Radio Hacker's Code Book, by George Sassoon, is for the person who has heard a little about Amateur Radio and wants to learn more about it.

Via the air waves messages are being sent from different countries all over the world (eg. from TASS, the news agency in Russia, oil prices from the USA etc.) and with the necessary equipment, these messages can be down loaded into a home-computer. The initial section of the book describes the various RTTY (radio teletype transmissions) and the way they are configured. It explains that there are various encrypted messages and provides a description on how to decipher these garbled messages with your Spectrum. Various programs are included in Basic and Machine Code demonstrating how to achieve the results your require.

The book isn't an easy read as the amount of technical data is vast and covers everything the enthusiast would need to know when embarking on amateur radio. This is not a book that can be read over the cornflakes in the morning, but for anyone who wants to know about amateur radio and its uses this is ideal. The price of £6.95 also is very reasonable and perhaps reflects the possibility that computer book prices are starting to come down. In the past, books of this technical nature have always been priced around £10.

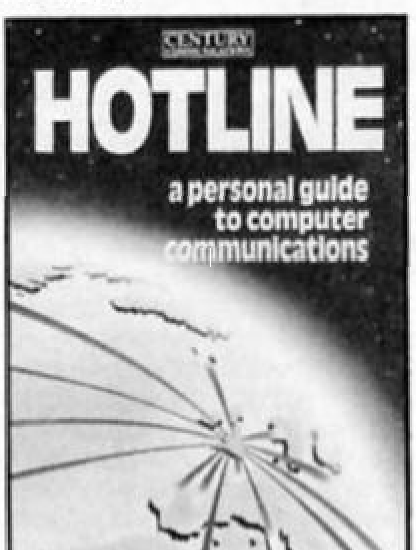
Comets

The second book this month is called Comets and is written by David Burgess. This is one of a new range of books by The Computer Club, which aims to provide informative books to be used in conjunction with a computer.

The comet book uses BBC Basic for all its programs, but these can easily be adapted for the Sinclair range, and a section is provided at the end of the book to help the reader with this task. The book should teach the reader all about comets and enable you to carry out astronomy projects with a Spectrum or similar machine. Comets are introduced, with a brief description of their history (did you know, for instance, that Halley's Comet is depicted in the Bayeux Tapestry?) and an explanation on how the individual can try to spot his own comet.

There are a number of programs in the book, including testing the user's ability to see if he can actually spot a comet, a complete drawing of the solar system and (the book would not be complete without one) a games program to save the Earth from the falling comet bugs!

The book contains a lot of information on the comet and its composition, is very easy to read and a bargain at £5.95 in hardback.



Hotline

The final offering this month is in the same area as the other two and is called Hotline, by Ben Knox. Retailing at £6.95 the book explains how, when armed with a computer, the world of networking, bulletin boards and electronic mail is at your fingertips.

The book is divided into two main sections and does assume the reader to have some basic computer knowledge. The first section explains how to go on-line and the second section shows what can be done once on-line.

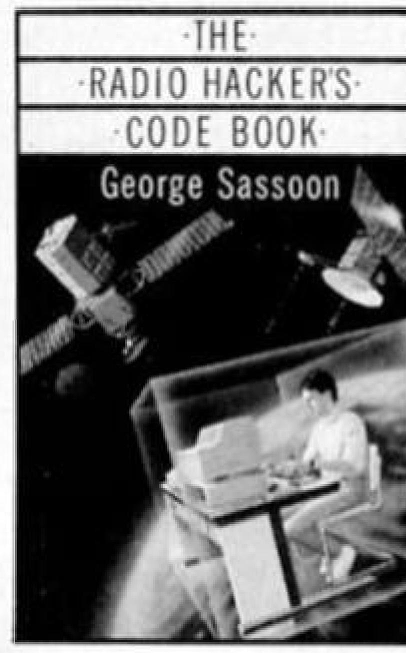
In order to do this, the computer needs a modem, which is a device that connects the computer to the telephone line. A modem stands for modulator/demodulator and allows data to be received or transferred via a telephone line. Modems come in different types, with various options and features and the book *adequately* covers all of these, with a brief explanation of each. It would have been more informative though if the author went into greater detail about the baud rate or bps (speed) of the modems, explaining what the different speed rates meant, and the effect on the quality of the data at the higher speed rate and various error checking facilities.

I would like also to have another moan about the section on Auto Dial modems. This claims that due to BT regulations, it is not possible for an auto-dial system to dial a number and, if engaged, repeat this until the line is free. This is not true. BT regulations allow a modem to repeatedly dial a number up to a maximum of five times in any four hours.

The book also claims that Hayes compatibility (an unofficial standard in the States) is not yet available over here. The Steebeck Dowty range *does* incorporate this Hayes standard.

After purchasing your modem software is then needed to allow your computer to communicate with the host computer via the telephone line. What you need to look out for when purchasing a software package is explained, but there are unfortunately no examples given of the best software packages. The remainder of the book discusses the various on-line systems available. Fortunately the author does not expect you to pay up and sign on to all the databases available, but explains how to use the systems in demonstration mode. Prestel is the obvious first choice, but there is also a list of all the current bill boards available in the UK.

When using commercial and international systems, long distance calls are often required and can be fairly expensive. British Telecom, surprisingly enough, do provide the answer with something called the Packet Switch System (PSS). PSS is cheaper because it allows a number of callers to use the same telephone line at the same time; the technical term for this is multiplexing.



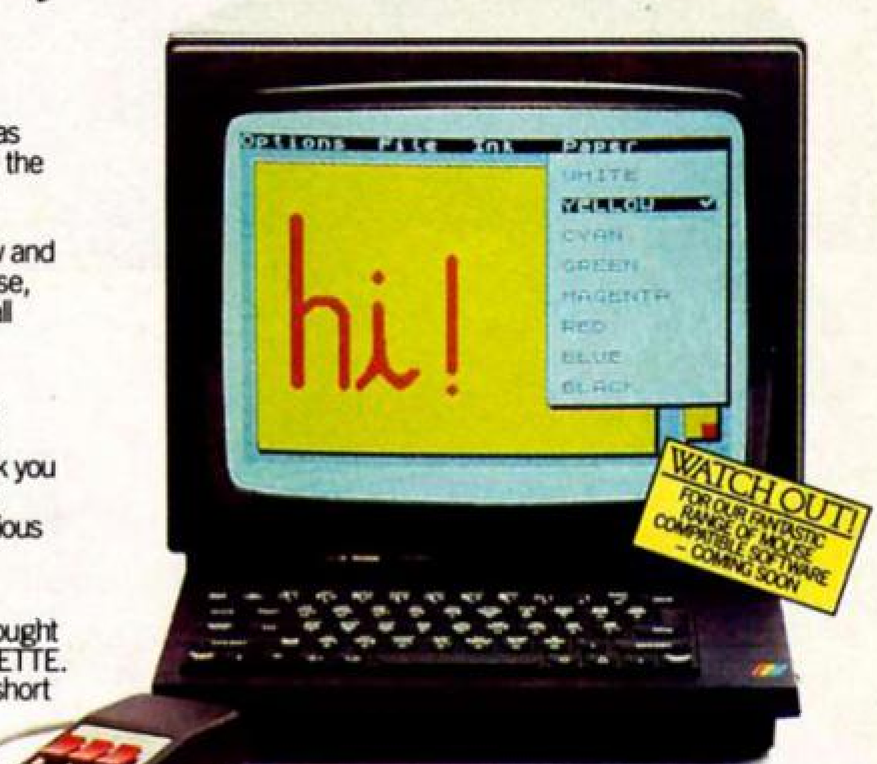
There is a PSS telephone number in most major cities and once dialled the user enters his network user ID and the address of the host computer which he wishes to call. The PSS then does the rest for the cost of a local call and a small user charge to BT for the use of PSS. It stands to reason that the computer you are dialling needs to be a PSS subscriber as well. PSS is definitely a thing of the future and is well detailed in this book.

The remainder of the book explains Telecom Gold, with its electronic mail and telex facilities and also looks at Compu-serve and Source, which are information retrieval systems in the United States. MUD, the Multi User Dungeon game is dealt with, and the book explains how to log on and obtain a free demonstration of the system. Again the author's research is lacking as the book states that PSS must be used to log on to the MUD. This is incorrect as it is possible to dial MUD direct.

The appendix of the book then covers various database services, gives a full specification of the RS232, although this is not really that useful, and a glossary of communication abbreviations and terms. All in all the book is very useful for anyone who wishes to know more about the communications age. In a few cases, the author gives incorrect details, which may be due to the book having been published in 1985, and if this is so, I do think that the book should have some sort of technical update for 1986.

Radio Hacker's Code Book, Duckworth, £6.95.
Comets, Macdonald, £5.95.
Hotline, Century Communications, £6.95.

We thought it was about time we put you in the picture.



When we introduced our AMX Mouse to micro-users, the response was phenomenal.

And no wonder!

Hailed by the press as 'probably the best input device that has arrived recently', the AMX Mouse brings to Spectrum 48K users, the same sophisticated, positive control that has, until now, been the province of more expensive computers – like the Macintosh.

The fantastic AMX Mouse Package opens up an entirely new and exciting world to Spectrum users and comes complete with Mouse, interface, which also includes a Centronics printer interface, and all these fabulous programs.

AMX ART

This computer aided, drawing program has to be seen to be believed. Making full use of on-screen windows, icons, pull-down menus and pointers, you'll be astonished at the quality of the work you can produce, save and print using either ZX or Epson compatible printers. It's a program ideal for both hours of family fun or for serious professional applications.

AMX COLOUR PALETTE

The wonderful pictures you create with AMX ART can be brought vividly to life with rich vibrant colours – using AMX COLOUR PALETTE. And with 8 Foreground and 8 Background colours you won't be short of inspiration.

AMX CONTROL

Now you can create a 'Mouse environment' in your own programs, AMX Control adds 28 commands to normal Sinclair Basic and contains three programs.

1. The machine code program to extend the Basic interpreter, which gives you full use of windows, icons, pull down menus, pointers and also supports AMX printer interface.
2. An Icon designer, an individual program for creating and storing icons for use in your own programs. The number and variety of icons you can create is limited only by your needs and imagination.
3. A demonstration program containing on screen calculator and puzzle.

This fabulous AMX Mouse Package costs only £69.95, a price as remarkable as the package itself and it includes a fully illustrated operating manual.



☎ FOR INSTANT ACCESS OR VISA ORDERS RING (0925) 4130501/2/3

The software is supplied on cassette and a tape-to-microdrive transfer facility is included. The AMX Mouse package is compatible with the Spectrum 48K and Spectrum +.

Ordering couldn't be easier.

This superb package is available from all good computer dealers or direct using the freepost order form below.

So what are you waiting for?

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128 TREASURE HUNT

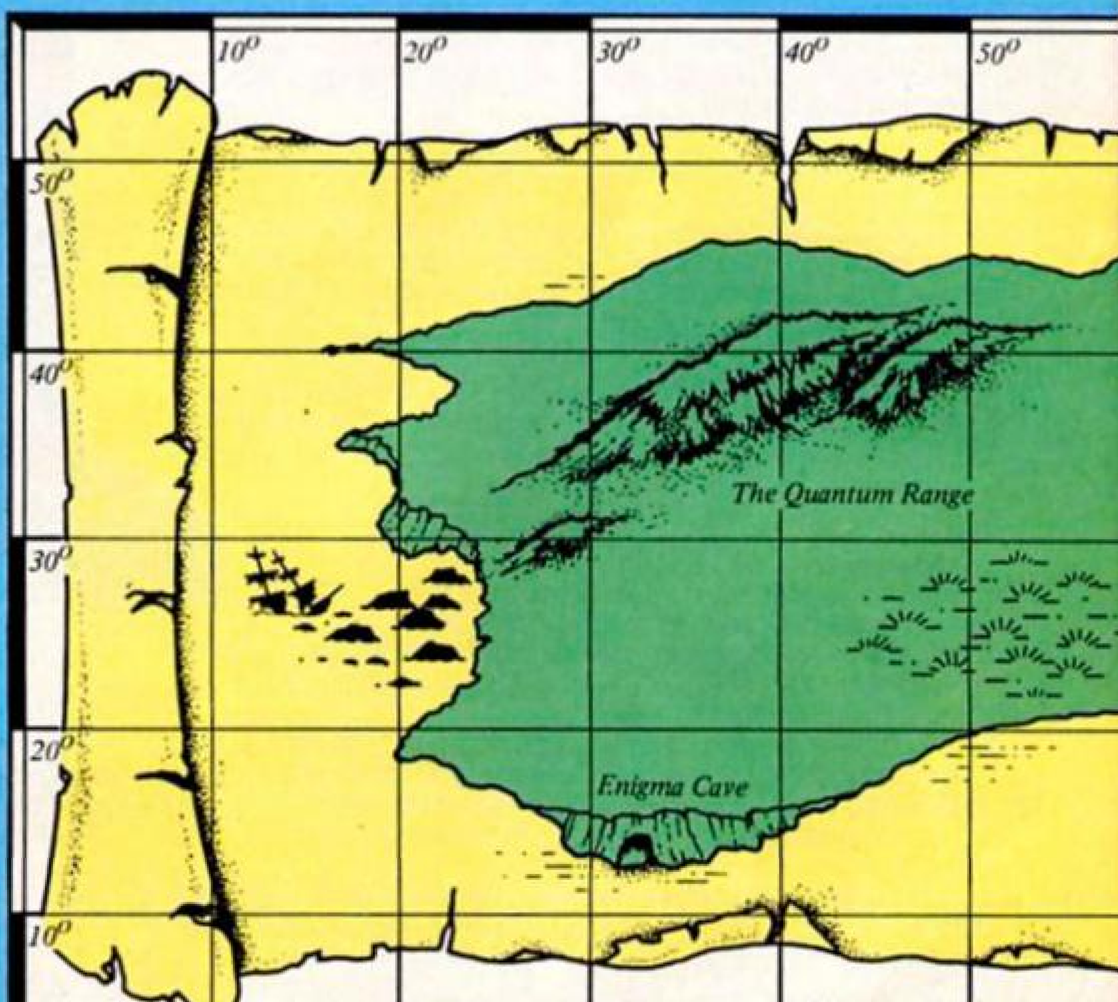


PART TWO

Is anybody there? If you're still with us and still looking for the chance to win one of Sir Clive's new Spectrum 128s, then just stick with us a little longer because we're about to give you the last few clues needed to locate the five machines hidden somewhere on our incredibly mysterious pirate treasure map.

If you've only just joined us (so where were you?) then you're lucky because we're going to let you join in too, by reprinting the clues that we published last issue. So, to recap we should explain that somewhere on the map below is a buried horde of treasure, ie five Spectrum 128s. All you have to do to find them is work out the latitude and longtitude coordinates of their location. This is done by answering the questions we'll give you and using the answers to work out the coordinates.

COMPETITION



Last month's questions, which gave you the latitude coordinate were:

1) How many Dalmatians in the title of the Walt Disney film?
2) Around The World in how many days?
3) How many Thunderbirds were there in the television puppet series?
4) How many years between Olympic Games?
5) How many Dr. Whos have there been in the television series?

Now to get the latitude coordinate what you do is: take the answer to question one and subtract from it the answer to question two. Add to that the answer to question three, then multiply the result by the answer to question four. Finally, add the answer to question five and that will give you a number representing the latitude position of the 128s.

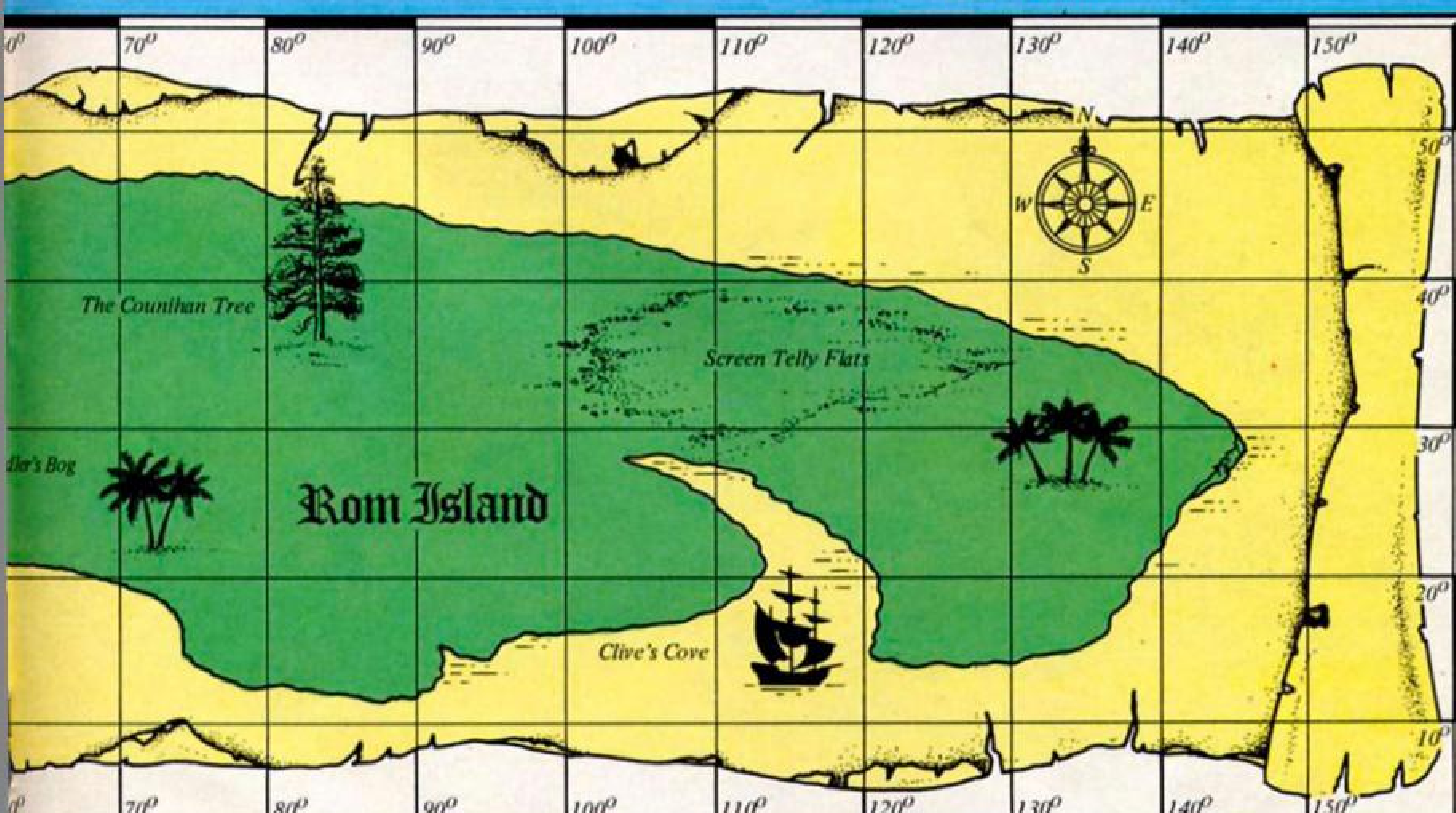
This month's questions which will give you the longtitude coordinate are as follows:

1) How many days were there in February 1986?
2) How many letters in the alphabet?
3) What is the square root of four?
4) How many versions of the Spectrum have there been before the 128?
5) How many times did Bjorn Borg win Wimbledon?

To get the latitude coordinate add together the answers to questions one and two. Divide that total by the answer to



This month we give you the final set of clues for finding the five Spectrum 128s that are up for grabs in our competition.



question three, then add the answers to questions four and five and you've got the latitude coordinate. As a tiebreaker, we'd like you to take a look at the picture of Sir Clive on this page and add a short caption. What is Sir Clive thinking?

The winners of the competition will be the five people who correctly pinpoint the 128s on the map and provide the best captions (and here the Editor's decision is final). The closing date of the competition is 6th June 1986.

128 Treasure Hunt Competition Entry Form

The 128s are buried at the following location:

Latitude = ... Longtitude = ...

My tiebreaker caption is: ....

Name ....

Address ....

Complete this coupon (no photocopies accepted) and send it to: 128 Treasure Hunt, ZX Computing, 1 Golden Square, London W1R 3AB. Entries to be received by first post on the 6th June 1986.

128 Doodler!

Spectrum Doodler
FE Electronics
£29.90

Like many of the products on show at the launch of the 128 the Doodler lightpen has only recently become fully available, and a first look at it seemed to indicate that like many of those other products this was just a 48K version hurriedly knocked together to be 128 compatible, but with no extra features to take advantage of the 128's extra memory.

The pen is connected to an interface which plugs into the rear port of the machine, but unlike the 48K version this interface now has an RGB lead rather flimsily connected to it which plugs into the 128's RGB socket. This must be plugged in, regardless of whether you are using a monitor or an ordinary TV, which means that the lightpen can only be used with the 128 (as the 48K machine doesn't have an RGB socket). That would seem to indicate that this is a peripheral intended purely for use with the 128. But the graphics software that comes with the pen will only run when the 128 is in 48K mode, which rather gives the game away.

Still, despite this I found that I did enjoy using the lightpen and that for certain purposes the pen was a more efficient tool than either a mouse or a joystick.

The Doodler software is an icon driven graphics package which allows you to use its facilities simply by pressing the lightpen onto the screen by the appropriate icon. Most of the time this then activates a pull-down menu which appears over the drawing area and allows you to select whatever option you choose. All the standard features that you'd expect are there; fill and brush, line, box, and circle drawing routines which are fast though there is no 'elastic' option which allows you to change the size of the shape before fixing it on the screen — if the shape you draw is slightly the wrong size you'll just have to erase it and draw another one.

Unfortunately the software, though quite sophisticated, isn't up to the standard of state of the art programs like The Artist or Art Studio — a number of important refinements such as a cut and paste option, and the ability to draw onto the area of screen occupied by the icons are missing. I also found the menu system a little cumbersome to use since the menus aren't self contained and changes that are made to one menu can often require you to make changes to another before you can get the effect that you want. That's a shame really, because though I found the software a little disappointing I enjoyed using the pen itself.

For freehand drawing I found that it allowed me to get better results than using a mouse or joystick because the pen really is in physical contact with the drawing surface (of the TV screen) and this allows finer control than any other method where the control instrument is at a distance from the surface of the screen.

The pen is quite sturdily constructed (the manual states that it was constructed to be able to survive use in classrooms) as is the interface, and only the apparently hasty addition of the RGB lead spoils the look of the unit.

The manual does give a few tips about how to write your own software for use with the lightpen, but that's a task that will be beyond most of us. If it were possible to patch together a routine allowing you to use the pen with The Art Studio (and I'm sure that it is, after all Kempston tell you how to adapt Art Studio for use with their mouse) then the combination of the two would work very well, and it would cost less than half the price of any of the mouse units on the market at the moment. As it stands, the lightpen hardware is very good but is let down a bit by its software.





The lightpen, and (above) a picture of a falcon drawn with it.

HARDWARE



Bulletin Boards aren't the only systems your machine can communicate with. Fred Mullins gives you a tour of the airwaves...

Mains interface

By sending RS232 data through the electric supply instead of over the telephone you can control different devices all over your house from one point. Any device you want to control only has to be plugged into the mains. This is done by mixing audio tones with the mains supply in a similar manner to the way a modem works.

Optical links

There are several ways to send computer data, some of them can be sent by using normal light, infra-red light or laser light over optical fibre. Pulses of light are sent in one direction only to a photocell at the other end, two systems being required if you want to send data both ways. These types of systems are currently being used for sending telephone calls and are being developed for cable TV transmission to run games services for computer users.

Infra-red can be used to control a model car in the same room because of its broadcast facility by bouncing it off the ceiling. For a simple experiment, a transistor powering a torch bulb can be used to send a beam of light to a phototransistor mounted in another reflector to send data across a room or street.

Data can also be sent over networks, these are systems designed to allow the connection of several computers and other pieces of equipment. They are mainly designed to share expensive things like discs, microdrives or printers, but they can also be used to communicate between different computers for things like internal electronic mail.

Sinclair put a network interface on Interface 1 which allows the connection of up to 64 different devices. The cabling is a cheap microphone lead and there is even a printer sharer program included on the demo cartridge that comes with the drive. Anything that can be SAVEd or LOADed can be sent over the net to one particular computer or broadcast to all of them. Different channels are left alone (ideal for classrooms or club rooms as well as offices).

Local networks can also be set up at work through the local telephone system (PABX), so that different extensions can send data as well as text through the system without affecting normal voice communications. The ICL one-per-desk has this facility, and is based on the Sinclair QL design. It has two extensions which can be used for voice or data and can be set up to auto-answer with a recorded speech message or data message-taking facility without interrupting the telephone user or his work on the computer. This is achieved by multi-tasking the programs. It can also be timed to send messages at cheap rates while the owner is not there.

Computers like the one the Open University runs can be used as a network by students to pass their results back to the lecturer or have it printed out at the local college rather than having to buy a printer themselves. As they do their work usually at home it is more convenient to send it from their own micro.

Radio

Radio is also being used in many ways by computers. There are experiments going on with Packet Radio, a similar system to Bulletin Boards over the airwaves between radio amateurs. Radio Teletypes have been around a long time (RTTY systems) and are used to send slow speed teleprinter data over the air waves. Recently, many of the big mechanical teleprinters have been replaced by 'Glass Teletypes' (computer terminals). Many frequencies are allocated for this use and you only need a receiver and an interface to watch weather or news broadcasts across the screen!

Modern Radio amateurs also have had satellites launched (the OSCAR series) which send back computer data as well as voice messages about their own internal workings as well as external events such as temperature etc.

Satellites

Satellites are an important development as they can broadcast over large areas from one transmitter and the transmitting/receiving dishes can now be quite small. Many commercial companies now have their own satellite links apart from British Telecom. They

are used to send voice and data and to date nobody has managed to hack one.

Satellite broadcasting is also used by the TV companies to transmit to large areas covering more than one country. These, like the modern CEEFAX and ORACLE teletext systems can also broadcast programs, data and information for computer users. The limiting factor for the average user is the cost of an aerial which could be over £1000, but, for a rental fee you may be able to gain access to one via one of the several companies who supply cable TV services. Weather satellites which give pictures such as you see on television weather bulletins are available through a simple radio receiver and adapted TV aerial and are free. They mostly consist of TV pictures showing cloud formations and rain belts. They are sent as ASCII data so a similar adaptor to the RTTY adaptor can be used.

Direct links

Directly wired RS232 or parallel port-to-port links can be used to link any types of computer together, though the software used has to be adjusted to the receiving computer. IBM for instance uses its own codes for screen control and uses synchronous transmission instead of the normal asynchronous transmission (i.e. it fills the blanks when no data is being sent with a special character). This is also used for sending data when a high speed is necessary. It can also be used to link a ZX81 to a Spectrum.

Hiring computers

Computer power can be hired over the telephone line in the form of Databases or Bureaus. The databases hold large stores of information that can be searched very quickly under a small program written by the user. The cost is the time of the search and cost of connection. Since these systems often use supercomputers like PRIME's and CRAY's you have quite a machine under your control and the computer time is usually measured in tenths of a second!

The Bureaus provide a service that allows you to use their computer instead of your own. They will work out large, complex equations, do your accounts, allow you to store large amounts of personal data or get access to details about the business you are interested in, such as a list of dangerous chemical mixes, problems with various drugs, who produces what products or how many people passed GCE English in 1973! (See The Hacker's Handbook for details.)

They are operated over a telephone line using a modem and can store the results of your question till you next contact the computer, to save you hanging on.

You can also hire networks such as Prestel and Telecom Gold to pass messages to another user, send Telexes or book a holiday. On Telecom Gold you can also get someone to contact you if they have a radio-pager, so your request beeps them to ring you back (useful if you have no idea where they are!).

Cellnet portable telephones are now acquiring a data facility which allows you to plug your computer in and send data over the normal telephone system while travelling in a car, bus or whatever. Recently I heard that airplanes are soon to be fitted with satellite discs so that telephone calls can be made by business men from the mid Atlantic!

For a cheaper, all data way, of saving on the telephone bill there is always PSS (Packet Switch System), a system of data telephone exchanges which is cheaper than the telephone for long distance calls. They are used by PRESTEL and TELECOM GOLD for customers that are in the country as they can usually use a local call to get on the PSS system, rather than ringing the service direct in a main town. An address is used to tell the PSS which number you want to call and because the data is sent at high speed through the system in packets (parcels of data) it keeps the cost down, because if you are not sending data someone else can be fitted into the same line. I hope all this has made you see your 'toy' computer in a new light, now here are some sources of information that will help you tap in to some of these systems.

Hacker's Handbook, published by Century Communications.

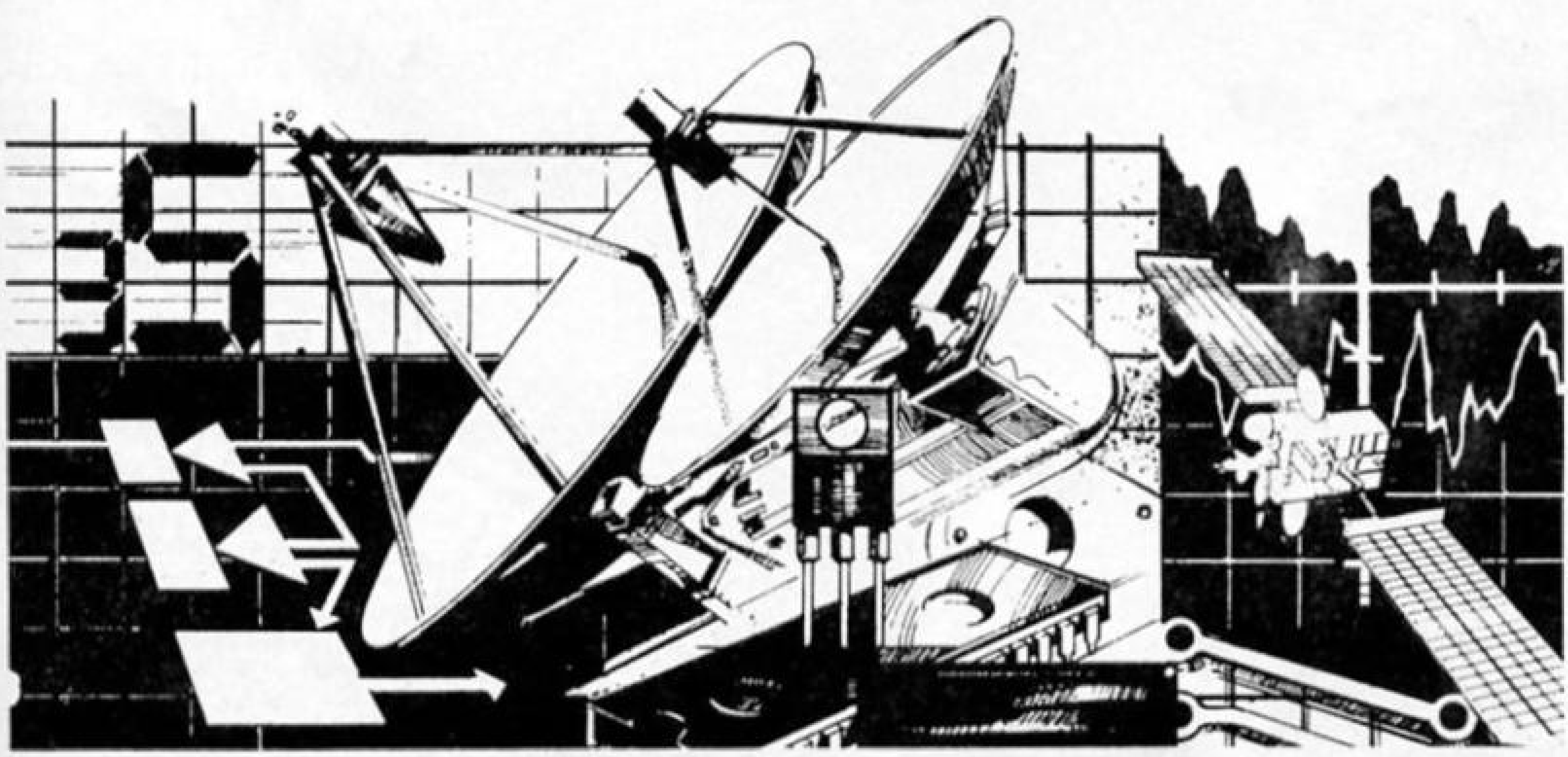
MAPLIN kits for mains interface, satellite reception, RTTY interface, P.O. Box 3, Rayleigh, Essex, SS6 8LR.

AMSAT-UK, 94 Herongate Road, Wanstead Park, London, E12 5EQ, for amateur satellites.

Scarab systems, Spectrum RTTY board and software £38.25. Tel: 0634-570441.

Technical software, Slow scan TV, RTTY (no hardware req.), AMTOR, CW program tape £25, Upper Llandwrog, Caernarfon, Gwynedd LL54 7RF. Tel: 0286-881886.

Sinclair Amateur Radio Users Group, Paul Newman, 3 Red House Lane, Leiston, Suffolk, IP16 4JZ, England.



INTO THE 128

Just how compatible is the 128? Toni Baker delves into the 128 ROM.

". . . It will load all programs which were specially written for the Spectrum 128, as well as many programs which were written for the Spectrum +, Spectrum 48K and 16K . . ." — extract from Sinclair ZX Spectrum 128 Introduction manual.

This article is all about Uncle Clive's new computer, the Spectrum 128. What it is, how it works, and what makes it tick. This article will be of use and interest to both Basic and machine code users.

The Spectrum 128 is, as its manual states, two computers in one. It can run as a 128 (which is almost as different from the old Spectrum as was the QL), or it can pretend to be an old Speccy, in which case it behaves exactly as though it were an ordinary Spectrum with 48K of RAM. When running as a 128 there are a couple of extra commands, and a few other extra features such as calculator and a renumber facility — these extra features are menu driven and cannot be initiated by a BASIC program.

But what exactly does this mean in terms of compatibility? The manual claims that the machine can run in 48K mode, and that it will then run *exactly* like an old Speccy. However, the following line:

IF PEEK 75 = 191 THEN PRINT "THIS IS NOT A SPECTRUM 128"

will give different results on an old Speccy to the new Speccy in 48K mode. This is a minor detail and you shouldn't worry too much about it — in general Sinclair's claim that a 128 in 48 mode behaves exactly like a 48 should be considered truthful.

128 mode, however, has quite a few differences — some of which could well produce incompatibility with programs written for the ordinary Spectrum. I'd like to examine these differences now, and discuss their consequences.

Character set

The first change is the character set. There are two differences in the character set which could affect the visual display of some graphics games. CHR$ 163 on the old Spectrum produced the user defined Graphic-T, and CHR$ 164 gave Graphic-U. On the new Spectrum they don't! CHR$ 163 gives the new keyword "SPECTRUM", and CHR$ 164 gives the new keyword "PLAY". This means that on the new Spectrum 128 there are only nineteen user defined graphics, compared with twenty-one on the 48.

The second change concerns the ZX Printer. *The printer will not work on the Spectrum 128.* This is of course quite a serious difference for anyone who owns a ZX Printer and not one of those expensive things you have to plug into the RS232. It means that unless you buy a 'real'



printer you can't list programs. Fortunately you don't have to buy an Interface One because the 128 already contains an RS232 Interface, although you still have to buy a lead.

The reason that the ZX printer doesn't work is that the printer buffer (the area of memory between hex 5BOO and 5BFF) is used by the 128 for paging-in new regions of memory and for storing a few tables and system variables. This has consequences for the machine code programmer. Any machine code program designed to utilise the memory in the printer buffer is likely to cause a crash!

The 128 contains at least two ROMs. The visible ROM is almost identical to the ROM of the old Spectrum, and contains the program for running BASIC. There is also an invisible ROM (invisible because you cannot read it using PEEK) which is paged in on power-up, and may be paged in using the code in the printer buffer. So far, I have not yet worked out how to utilise this ROM from machine code but I can make a guess as to what it contains. It must contain the program to operate the menus, the renumber facility, the calculator, and the new commands SPECTRUM and PLAY.

The ordinary ROM is, as I said earlier, almost identical to the old Spectrum ROM. This means that machine code programs which make use of subroutines in the ROM will still run perfectly well. No subroutine addresses have been changed, but the ROM is still *slightly* different. The space at the end of the ROM (addresses 386E to 3CFF) which used to be unused now contains some new code. There are also minor changes to the main bulk of the ROM.

The new ROM

The first change is to the interrupt routine at 0038. Two bytes have been changed at 004B and 004C, changing what used to be CALL 02BF to CALL 386E. Note that the keyboard routine at 02BF still exists, but it is not called by the interrupt routine directly. Instead, a new routine at the end of the ROM is called. You see, the Spectrum 128 has provision for an add-on keypad which will contain a few extra keys. These changes to the interrupt routine ensure that the new keypad keys are also scanned and registered.

The next change is to the printing of graphics and tokens. Four bytes at OB52 have been changed, from **SUB A5/JR NC,** to **JP 3B9F/NOP.** The purpose of this change is to ensure that characters 163 and 164 are correctly expanded to give the two new keywords "SPECTRUM" and "PLAY".

At 2646 there is a change to the INKEY$ routine. What used to be **CALL O28E** is now **JP 3B6C.** Again, the purpose of this change is to ensure that the new keypad can be registered — this time so that INKEY$ is capable of reading the keypad keys.

Finally, there are three rather more fundamental changes. Four bytes at 1349, four bytes at 1B7D, and three bytes at 1BF4 have been changed, making alterations to the main execution loop, the statement-return routine, and the next-statement routine respectively. These changes cause control to enter the new (and so far invisible) ROM, and hence to carry out the new Basic commands, operate the full screen editor, and so on and so forth. These are the important ones, and any machine code program which relied upon the main execution loop will probably crash on the new machine. Such programs are few and far between (although one of mine now suffers from this disadvantage).

If the Spectrum 128 is operating in 48K mode then none of the above listed changes will make any difference. Both BASIC and machine code programs will run exactly as they did before. The only possible exceptions to this rule are programs which directly PEEK the ROM at one of the changed locations (such as the BASIC line listed earlier) — but these are programs deliberately constructed to be different, and are therefore not a major worry.

The Spectrum can easily tell which mode it is in (128 or 48) by looking at bit 4 of the system variable FLAGS. In the old Spectrum this bit was unused, but in the new Spectrum it is used even when operating as a 48K. The flag is invariably RESET for 48K mode, or SET for 128K mode. It is not, however, possible to enter 128K mode simply by changing the value of FLAGS, since the information which 128-mode needs in the printer buffer will not be there. But one important consequence of this is that *it is possible for a machine code program to tell what kind of Spectrum it is running on.* Such a program must first read address 004B — if it contains BF then this is an old Spectrum; if it contains 6E then this is a Spectrum 128. (If it contains anything else then you've probably got the Interface One Shadow ROM paged in.) Then — if you're sure that this is a Spectrum 128 — you can read bit four of FLAGS, and if it's set it means that the machine is currently in 128 mode.

The same can be done in BASIC, as the program below will demonstrate:

```
10 IF PEEK 75 = 110 THEN GO TO 40
20 PRINT "THIS IS NOT A SPECTRUM 128"
30 STOP
40 LET x = INT (PEEK 23611 / 16)
50 LET z = 128
60 IF x/2 = INT (x/2) THEN LET a = 48
70 PRINT "THIS IS A SPECTRUM 128""IN";a;"K MODE"
```

Loss of memory?

Nextly, I want to talk about the Spectrum 128's extra memory. On a 48K Spectrum DIM A$(40000) will not. (Error 4 Out of memory). One would assume that a machine with 128K should be able to store much larger strings. Unfortunately this is not the case! Even in 128K mode, DIM A$(40000) will work, but DIM A$(42000) will fail (Error 4 Out of memory). So where is all this extra memory?

The answer is that the new memory is used as what Sinclair refers to as 'RAM disk'. The only way to use it (without complicated machine code paging which I don't understand yet) is to transfer blocks of memory to and forth between the conventional memory and the new memory (RAM disk). You can do this from BASIC using the new commands LOAD! and SAVE! (the exclamation mark is crucial). You can use the new memory to store either data or programs (BASIC or machine code). This system doesn't cause any real problems and it is really quite simple to use the extra memory, making it at last possible to write really long machine code programs, or a BASIC program with really large amounts of data (or extra program lines which may be recalled using MERGE!). Unfortunately, I still haven't managed to locate 128K yet. I have found that I can store up to 71K in the RAM disk area — after that I get error 4 Out of memory. Now 71K plus 48K equals 119K, *not* 128K. If anyone finds out where this missing 9K of memory is would they please let me know.

To conclude, I believe that the Spectrum 128 is brilliant. It is completely compatible with the old Spectrum (with the exceptions I've listed above), and is superior in every way. The extra memory is only one of its superior features. It has better sound, better editing, and an RS232 interface built in (as well as a monitor port). It's well worth buying and I recommend it to anyone who can afford the £180.00 price tag.



The loading screen

MASTERB

On a flying trip to England to approve the Spectrum version of Ballblazer, David Levine of Lucasfilm Games found time to chat with ZX about the game and the future of 'Interactive Entertainment'.

Activision's London headquarters are situated in a highly desirable terrace of Victorian houses just off Marylebone Rd. When I arrived there, Rod Cousens of Electric Dreams was looking for an empty office to hold a meeting in, but David Levine was nowhere to be seen. It turned out that he'd just popped out for something to eat.

While I waited I overheard some interesting snatches of telephone conversations. This was Thursday and the game had to be approved by Monday, but there seemed to be some disagreement over the graphics. David, as Lucasfilm's representative, has final approval over the game and apparently would like to see some minor changes. Despite this, relations between David and Activision's programmers are very friendly.

Graeme Devine, author of the Spectrum version of Ballblazer told me; "David's a very nice guy. We get on with him very well." At which point David arrived.

At twenty six, and very soft-spoken, he doesn't look like a British programmer, instead, with his ponytail and light beard he looks very West Coast USA.

Born in Chicago, David began his career while still at college, doing various work courses before starting out as a professional hardware designer. This was followed by a couple of years at a UNIX software house in Chicago. Then;

"I heard about Lucasfilm, went out there and got a job."

Lucasfilm Games is now quite a large organisation it seems.

"It started with four research staff, but has now changed to a production arrangement, with a dozen programmers and other staff organized on individual projects."

"George (Lucas) sees a huge future in interactive entertainment."

Lucasfilm's move into computer games was the result of George Lucas' plans for the future.

"The industry was booming at the time and George wanted to get into interactive entertainment. George believes there's a huge future in interactive entertainment."

'Interactive entertainment' is a phrase that David uses frequently during our conversation, and this is where the link with Lucasfilms becomes important. As computer graphics become frequently used more in films, and home computers become more powerful, Lucasfilm foresee computer games becoming almost like interactive films. Already in the USA there are 'walk through' arcade games in which the player, rather than standing in front of a small video screen, steps into a large cubicle where he or she is surrounded by video images, just like being part of the action.

"Yes, that's the next generation of arcade hardware — an interactive entertainment environment. But the architecture of home machines won't support that at the moment. What I'd really like to see is someone like Clive Sinclair developing a low-cost interactive home machine."

It's interesting to hear that David sees a difference between "that elusive interactive entertainment machine of the future" and most home computers. He feels that it's not necessary to produce general purpose computers that can balance books, or act as a word-processor as well as playing games, and that it should be possible to produce a machine totally dedicated to interactive entertainment.



David Levine

"Why aren't computer companies making machines that can exploit the full range of the video screen? We have the ability to create realistic images and sounds with high speed animation but computer companies aren't giving us the hardware."

"Computer games are the only field open to us for what we want to do at the moment. We want to produce interactive entertainments for everyone, but not everyone has a machine or even the same machine. I'd love everyone to have the same machine."

This talk of differing machines brings us neatly to the conversion of Ballblazer onto the Spectrum. How closely is Lucasfilm involved in the conversion process?

"We ended up doing the Commodore version after the contracted-out conversion failed. So we were involved in that. We generally develop Atari and Commodore versions simultaneously, but we've had trouble with getting conversions done properly in the past so we do it ourselves if we've got the expertise."

"With the Sinclair version of Ballblazer we're involved to the extent of making sure that the programmers are getting it right."

Did David feel that a machine like the Spectrum could do justice to the game?

"What makes Ballblazer different is that unlike other games it's not just a simulation. It's really a mathematical model of the physics involved. The graphics on each machine might be different but the underlying principle is what makes the game. For an 8-bit machine it's a very sophisticated mathematical model, so the graphics have to be done properly to represent speeds and distances, but that's it."

"It's a 'kineasthetic' experience based on how you feel. Soccer is the closest analogy — you don't know how it feels unless you play it, so judging Ballblazer by how it looks is wrong. It's meant to be felt. It's a game of finesse, subtle refined control — I hope that a European audience can appreciate that perhaps more than in the US."

"Personally, I think that entertainment is the highest form of programming."

Looking to the future, will the link with Lucasfilm lead to a series of titles based on Lucas films?

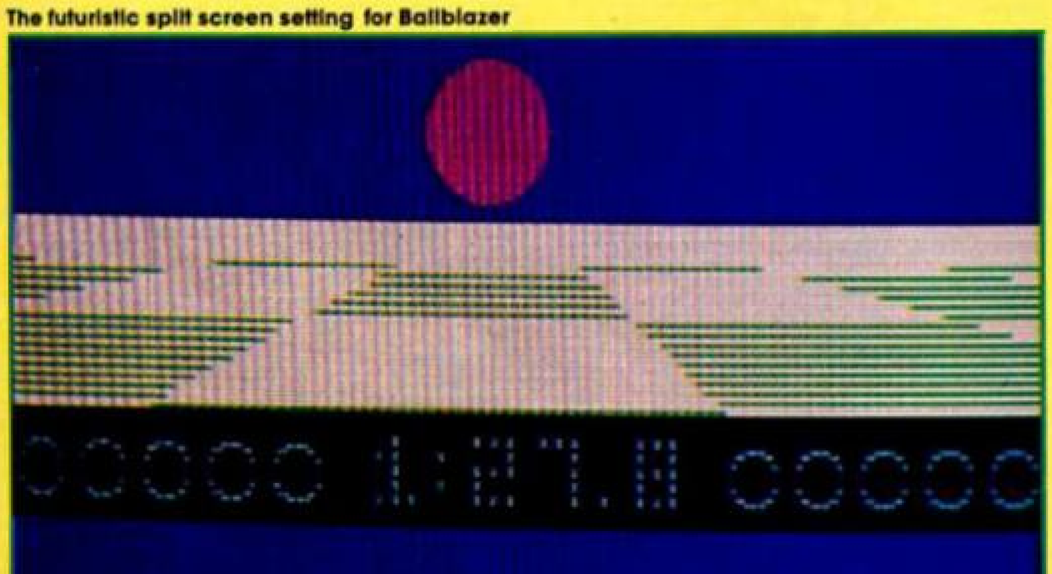
"There have been some, but they've been done by others in the past. As each film comes out we'll evaluate it as the basis for a film — Labyrinth a new film starring David Bowie and directed by Jim Henson, creator of the Muppets is an opportunity to experiment, but not all films are suitable."

Further in the future, it seems that more people in the states are starting to think along the lines of David's interactive entertainment machine. He thinks that Clive Sinclair's 'lightweight technology' is a good thing, but wishes he could expand the machines' capabilities. Again, he says that it's not necessary to produce a general purpose computer. But, as so many people argue, isn't it a waste to devote all that high technology to playing games?

"Personally I think that entertainment is the highest form of programming. The ability to entertain people, to make them feel good, separates the art of programming from the business of writing applications. Writing spreadsheets — anyone can do that!"

LAZER

The futuristic split screen setting for Ballblazer



LIGHT SCREEN DESIGNER

Concluding Toni Baker's series with the second half of last month's listing.

Light Screen Designer has been a feature in ZX for the past two years and in this issue we bring you the last segment of the program. If you have followed the series from the start you will find next month's article invaluable. Toni Baker has written a manual to accompany the program which will show you how to use Light Screen Designer to its best advantage.





```
                        ORG E874
DDCB00FE  PAINT         SET 7,(J_FLAGS)     Signal "Now doing PAINT".
CDCCDC                  CALL DCCC,MESSAGE
02                      DEFB 02             Input required paint colour.
1807                    JR PAINT/FILL

                        ORG E87E
DDCB00BE  FILL          RES 7,(J_FLAGS)     Siganl "Now doing FILL".
3A8D5C                  LD A,(ATTR_P)       A:= current attribute byte.
E607      PAINT/FILL    AND 07              A:= required paint colour.
3249DB                  LD (NEW_COLOUR),A   Store paint colour.
012000                  LD BC,0020
CD2EEB                  CALL EB2E,TEST_MEM  Store SCR2 if there is enough memory.
210000                  LD HL,C000          Point HL to first byte of SCR2.
1101C0                  LD DE,C001          Point DE to second byte of SCR2.
01FF17                  LD BC,17FF          BC:= Number of bytes in screen less one.
3600                    LD (HL),00          Clear first byte.
EDB0                    LDIR                Clear remaining bytes.
3A16DB                  LD A,(CURSOR+2)     A:= pixel column number of cursor.
E607                    AND 07
47                      LD B,A
04                      INC B               B:= position within byte of cursor.
3E01                    LD A,01
0F        PF_ALLIGN     RRCA
10FD                    DJNZ PF_ALLIGN      Allign set bit to correct position in A.
2A14DB                  LD HL,(CURSOR)      HL:= address of screen byte containing
                                            cursor.
F5                      PUSH AF
CD9EE7                  CALL E79E,SR_PTRS   BC: points to corresponding attr byte.
                                            DE: points to corresponding SCR2 byte.
F1                      POP AF
12                      LD (DE),A           Set one pixel at cursor position,
                                            indicating a known interior point.
A6                      AND (HL)
0A                      LD A,(BC)           A:= attribute byte at cursor position.
2003                    JR NZ,PF_OLDCOL     Jump if cursor position is INKed.
0F                      RRCA
0F                      RRCA
0F                      RRCA
E607      PF_OLDCOL     AND 07              A:= colour of pixel at cursor posn.
3248DB                  LD (OLD_COLOUR),A   Store this as the "old" interior colour.
DDBED9                  CP (NEW_COLOUR)
2005                    JR NZ,PF_BEGIN      Jump unless old colour same as new.
DDCB007E                BIT 7,(J_FLAGS)
C0                      RET NZ              Return if doing PAINT.
DDCB00F6  PF_BEGIN      SET 6,(J_FLAGS)     Signal "Not finished yet".
DDCB00A6                RES 4,(J_FLAGS)     Signal "Scanning from top to bottom".
DDCB00AE  PF_LOOP       RES 5,(J_FLAGS)     Signal "Scanning from left to right".
CDAAE7                  CALL E7AA           Scan row left to right.
DDCB00EE                SET 5,(J_FLAGS)     Signal "Scanning from right to left".
CDAAE7                  CALL E7AA           Scan row right to left.
DDCB0066                BIT 4,(J_FLAGS)
7C                      LD A,H
2009                    JR NZ,PF_CHK_TOP    Jump if scanning from bottom to top.
FE57                    CP 57
200D                    JR NZ,PF_CONT
7D                      LD A,L
FEA0                    CP A0
1806                    JR PF_CHK_BOUND
FE40      PF_CHK_TOP    CP 40
2004                    JR NZ,PF_CONT
7D                      LD A,L
```

```
A7                      AND A               Jump to change direction if at top
285F      PF_CHK_BOUND  JR Z,PF_CHANGE      or bottom of screen.
                                            Stack attribute pointer.
C5        PF_CONT       PUSH BC             Stack SCR2 pointer.
D5                      PUSH DE             Stack screen pointer.
E5                      PUSH HL             Reset carry.
A7                      AND A               Store reset carry in F' to signal
08                      EX AF,AF'           "No new pixels marked".

D5                      PUSH DE
D9                      EXX
E1                      POP HL              HL':= SCR2 pointer.
D9                      EXX
7C                      LD A,H
17                      RLA
17                      RLA
17                      RLA
AC                      XOR H
E6C0                    AND C0
AC                      XOR H
67                      LD H,A
7D                      LD A,L
1F                      RRA
1F                      RRA
AC                      XOR H
E638                    AND 38
AC                      XOR H
47                      LD B,A              B:= row number of current row.
DDCB0066                BIT 4,(J_FLAGS)
2002                    JR NZ,PF_1          Jump if scanning from bottom to top.
04                      INC B
04                      INC B
05        PF_1          DEC B               B:= row number of next row to scan.
0E00                    LD C,00
CD41DD                  CALL DD41,PIX_ADDR  HL:= address of new row.
CD9EE7                  CALL E79E,SR_PTRS   BC:= address of new attributes row.
                                            DE:= address of new SCR2 row.
C5                      PUSH BC             Stack attributes pointer.
D5                      PUSH DE             Stack SCR2 pointer.
E5                      PUSH HL             Stack screen pointer.
CD78E7    PF_LOOP_2     CALL E778,COL_TEST  Test for colour match for this square.
3004                    JR NC,PF_2          Jump unless exactly one colour matches.
2F                      CPL                 A:= 00 (INK match), or
                                                FF (paper match).
```

```
AE              XOR (HL)            A:= next byte from screen, with each
                                    bit set if the colour matches the
                                    intérior colour, reset otherwise.
1802            JR PF_3
280C    PF_2    JR Z,PF_NEXT        jump if the attruibute does not
                                    contain the interior colour.
D9      PF_3    EXX
A6              AND (HL)            Each bit will remain set only if
D9              EXX                 the corresponding pixel is (a) the
                                    right colour, and (b) directly above
                                    (or below) a known interior pixel.
EB              EX DE,HL
B6              OR (HL)             Also include any known interior
                                    pixel from this row.
77              LD (HL),A           Store in SCR2
EB              EX DE,HL
A7              AND A
2802            JR Z,PF_NEXT        Jump unless at least one pixel in
                                    this byte is now known to be interior.
37              SCF
08              EX AF,AF'           Store set carry to indicate "At least
                                    one pixel on this row is interior."
03      PF_NEXT INC BC              Increment attributes pointer.
13              INC DE              Increment SCR2 pointer.
23              INC HL              Increment screen pointer.
D9              EXX
23              INC HL              Increment SCR2 pointer to row above
D9              EXX                 (or below).
7D              LD A,L
E61F            AND 1F
20DE            JR NZ,PF_LOOP_2     Jump back unless at end of row.
E1              POP HL              Screen pointer now at start of row.
D1              POP DE              SCR2 pointer now at start of row.
C1              POP BC              Attributes pointer now at start of row.
08              EX AF,AF'           Retrieve carry flag.
3006            JR NC,PF_CHANGE_1   Jump if there were no known interior
                                    points on this row.
```







```
F1                      POP AF
F1                      POP AF
F1                      POP AF
C3D0EB   PF_JUMP        JP EBD0,PF_LOOP       Jump to scan next row.
E1       PF_CHANGE_1    POP HL                Screen pointer now at start of
                                              previous row.
D1                      POP DE                Same for SCR2 pointer.
C1                      POP BC                And attribute pointer.
3A40DB   PF_CHANGE      LD A,(J_FLAGS)
EE50                    XOR 50                Change scan direction flag and
3240DB                  LD (J_FLAGS),A        "Finished yet?" flag.
CB77                    BIT 6,A
28EE                    JR Z,PF_JUMP          Jump back unless finished.
010058                  LD BC,5800            BC points to first attribute byte.
1100C0                  LD DE,C000            DE points to first SCR2 byte.
210040                  LD HL,4000            HL points to first screen byte.
3A49DB                  LD A,(NEW_COLOUR)     A:= colour to paint.
07                      RLCA
07                      RLCA
07                      RLCA
3248DB                  LD (OLD_COLOUR),A     Store 8*colour.
E5       PF_SQLOOP      PUSH HL               Stack screen pointer.
D5                      PUSH DE               Stack SCR2 pointer.
C5                      PUSH BC               Stack attribute pointer.
010008                  LD BC,0800
1A       PF_SQUARE      LD A,(DE)             A:= next byte from SCR2.
A6                      AND (HL)
2802                    JR Z,PF_P_EXT
CBD9                    SET 3,C               Set flag if you come across an INKed
                                              interior point.
1A       PF_P_EXT       LD A,(DE)
2F                      CPL
B6                      OR (HL)
3C                      INC A
2802                    JR Z,PF_I_EXT
CBD1                    SET 2,C               Set flag if you come across a PAPERed
                                              interior point.
1A       PF_I_EXT       LD A,(DE)
2F                      CPL
A6                      AND (HL)
2802                    JR Z,PF_P_INT
CBC9                    SET 1,C               Set flag if you come across a INKed
                                              exterior point.
1A       PF_P_INT       LD A,(DE)
B6                      OR (HL)
3C                      INC A
2802                    JR Z,PF_I_INT
CBC1                    SET 0,C               Set flag if you come across a PAPERed
                                              exterior point.
14       PF_I_INT       INC D                 SCR2 pointer to next row.
24                      INC H                 Screen pointer to next row.
10E0                    DJNZ PF_SQUARE        Repeat for all rows of chr square.
0608                    LD B,08
79                      LD A,C
D604                    SUB 04
```

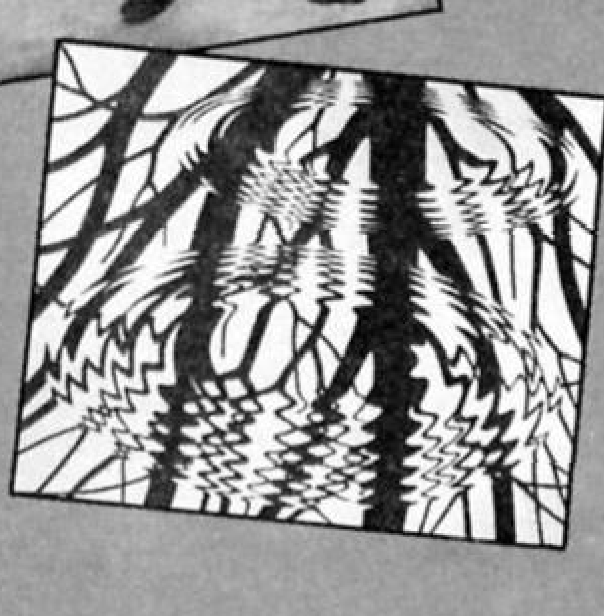
```
385B                  JR C,PF_NXT_SQ        Jump if every pixel in the square
                                            is exterior
DDCB007E              BIT 7,(J_FLAGS)
280A                  JR Z,PF_SET_LOOP      Jump if doing FILL.
A7                    AND A
2843                  JR Z,PF_ALL_PP        Jump if every pixel is a PAPERed
                                            interior point.
D602                  SUB 02
2833                  JR Z,PF_CH_PP         Jump if this is a boundry square with
                                            paper interior, ink exterior.
3D                    DEC A
2009                  JR NZ,PF_A1           Jump unless the square contains an
                                            INK boundry separating two PAPER
                                            regions, one interior, one exterior.
15        PF_SET_LOOP DEC D                 SCR2 pointer to next row.
25                    DEC H                 Screen pointer to next row.
1A                    LD A,(DE)
B6                    OR (HL)
77                    LD (HL),A             INK all interior pixels.
10F9                  DJNZ PF_SET_LOOP      Repeat for whole character square.
1811                  JR PF_CH_INK
3D        PF_A1       DEC A
200B                  JR NZ,PF_A2           Jump unless every pixel is INKed and
                                            interior.
AF                    XOR A
DDCB086E              BIT 5,(OLD_COLOUR)
200C                  JR NZ,PF_SET_INK      Jump if new colour is light.
3E38                  LD A,38               Set paper colour white.
1808                  JR PF_SET_INK         Jump to change attribute byte.
3D        PF_A2       DEC A
200A                  JR NZ,PF_A3           Jump unless this is a boundry square
                                            with ink interior, paper exterior.
C1        PF_CH_INK   POP BC
0A                    LD A,(BC)             A:= attribute byte of current square.
C5                    PUSH BC
E638                  AND 38                Isolate paper colour
DDB609    PF_SET_INK  OR (NEW_COLOUR)       Change ink colour.
1824                  JR PF_ST_ATTR
D602      PF_A3       SUB 02
200F                  JR NZ,PF_A4           Jump unless the square contains a
                                            PAPER boundry separating two INK
                                            regions; one interior, one exterior.
```





```
15        PF_RES_LOOP DEC D                 SCR2 pointer to next row.
25                    DEC H                 Screen pointer to next row.
1A                    LD A,(DE)
2F                    CPL
A6                    AND (HL)
77                    LD (HL),A             PAPER all interior pixels.
10F8                  DJNZ PF_RES_LOOP      Repeat for whole character square.
C1        PF_CH_PP    POP BC
0A                    LD A,(BC)             A:= attribute byte of current square.
C5                    PUSH BC
E607                  AND 07                Isolate ink colour.
180E                  JR PF_
25        PF_CLR_LOOP DEC H                 Screen pointer to next row.
3600                  LD (HL),00            PAPER every pixel.
10FB                  DJNZ PF_CLR_LOOP      Repeat for whole character square.
AF        PF_ALL_PP   XOR A                 A:= 00. (Ink black).
DDCB0956              BIT 2,(NEW_COLOUR)
2002                  JR Z,PF_SET_PP        Jump if new colour is light.
3E07                  LD A,07               Set ink colour white.
DDB608    PF_SET_PP   OR (OLD_COLOUR)       Change paper colour to new colour.
C1        PF_ST_ATTR  POP BC
02                    LD (BC),A             Store new attribute byte.
C5                    PUSH BC
C1        PF_NXT_SQ   POP BC                BC:= attribute pointer.
D1                    POP DE                DE:= SCR2 pointer.
E1                    POP HL                HL:= screen pointer.
03                    INC BC                Increment attribute pointer
13                    INC DE                Increment SCR2 pointer.
23                    INC HL                Increment square pointer.
7D                    LD A,L
A7                    AND A
2009                  JR NZ,PF_J2           Jump unless at end of "third" of
                                            screen.
7A                    LD A,D
C607                  ADD A,07
57                    LD D,A                DE: points to next square.
E67F                  AND 7F
67                    LD H,A                HL: points to next square.
FE58                  CP 58
C2735E9               JP NZ,E973,PF_SQLOOP  Jump back unless at end of screen.
C9                    RET
```





```
                      ORG EA12
3E40      CURSOR_TYPE LD A,40
C32ADF                JP DF2A,CT_H
```

KEMPSTON MOUSE OFFER

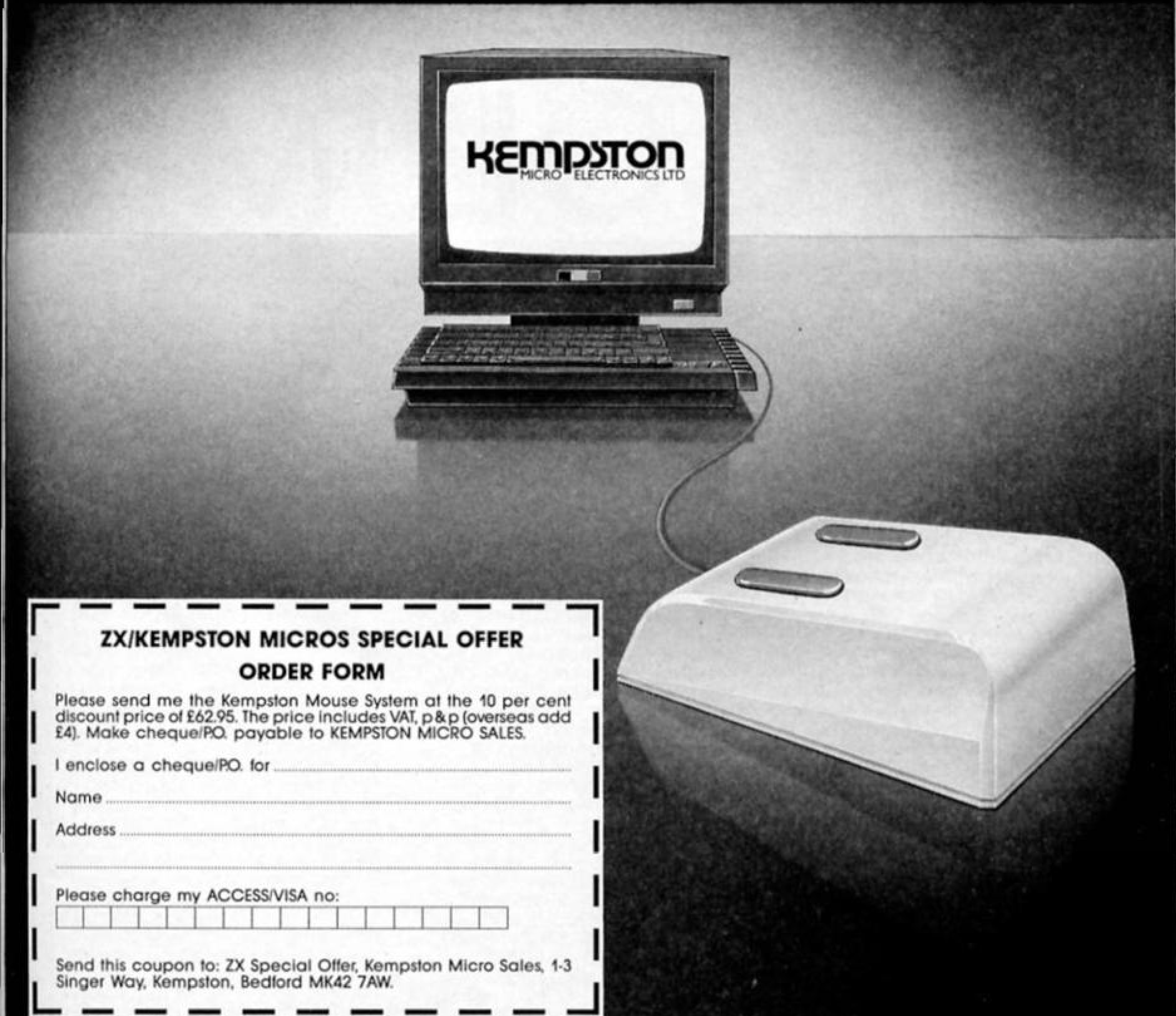
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QL COLUMN

The long awaited Spectrum 128 is on the shelves at last, but if Sinclair is pinning its hopes of appeasing the bank manager on a new model of an old machine, what of the QL which helped get the company into deep water in the first place?

Originally aimed to sell in that never-never market separating the honest-to-god business machine (a computer which helps you make money) from any of the less pricey bits of electronic wizardry aimed at home entertainment (computers which help you spend money), the QL's promised 'quantum leap' went over more like the proverbial lead balloon.

The latest QL ROMs have eliminated many (but sadly not all) of the original bugs and Psion's four freebie software packages have been improved to the point of true excellence. Other heavy-duty QL software available now includes Metacomco's C and Pascal compilers, Microdeal's Flight Simulator and two accountancy packages (Cash Trader and Integrated Accounts) which offer precisely that small business capability promised in those early hope-filled days when the computer was first launched on a cynical market.

Despite these advances, things aren't looking all that much better (there is still a real shortage of quality games). Tandata recently cut the cost of its QL communications package by some £60 signalling good news for the customer but a slow turnover. Some time back, the leading magazine for QL users went to the wall (though it's just been relaunched) suggesting that even the computer's owners aren't all that interested in reading about it.

Towards the end of last year, Sinclair slashed the QL's RRP to £199 (thereby annoying everybody who paid £399) giving sales a predictable, and predictably short-lived, boost. Ever optimistic peripheral salesmen regaled visitors (any who would listen) to the PCW show with visions of vast new markets but it all looks to have been something of a false dawn. According to the resident mole at Sinclair, Christmas QL sales were "disappointing" while the Spectrum+ swept the field. Adding insult to injury, the troubled QL now faces some very stiff competition from Sinclair's very own 128K Spectrum. Technically speaking, there is a huge difference between the two but a lot of ordinary folk with a couple of hundred quid to invest in a new-generation home micro are likely to opt for the £20-cheaper, better known, up-graded Spectrum+ with its vast reservoir of 48K games and the lure of an up-coming flood of 128K software.

So, whither the QL? It is an excellent machine at a bargain-basement price with more and more reasonably priced, quality software coming on-stream. But it still wanders between the bottom end of business and "serious" computing market where it truly belongs, and the top end of the games arena (where it's largely wasted) like some modern-day Flying Dutchman destined to never quite reach port.

It's an open secret that Sinclair is seriously considering releasing a new-model QL to take on the Amstrads and Ataris of this world. According to one of Sinclair's deeper burrowed moles, the leading scheme at the moment is to drop the ever controversial microdrives into the 'jolly good try' bin and market a QL with an in-built 3.5" disc drive. The revamped QL (very possibly with added, on-board memory) would be packaged with a colour monitor and would sell for around £350. There was talk of a Spring release but financial discretion seems to be the better part of marketing valour for the time being and the prevailing mood is one of "let's wait a bit and see how the new Spectrum goes before taking a gamble we can't really afford". From an accountant's point of view, this makes a great deal of sense as the company is still on the verge of insolvency but it must be really galling to watch competitors like Amstrad take bite-sized chunks of the small business systems market which the QL was first aimed at and once had all to itself. It would thus take a pretty bold prophet to insist that Sinclair won't take the plunge and show us another QL at the next PCW Show.

Supercharge

Anybody planning to buy Digital Precision's Supercharge compiler for QL Basic should make sure they're getting the latest version which gets rid of (all?) the teething bugs in the original (the version reviewed last issue was V1.16). None looked especially serious but they could be annoying and it costs a couple of bob for the up-date. My favourite was in the lenslock security system (a needless torture worthy of either damnation or aversion therapy) which, when I tried to adjust the size of the entry code on the screen with a silly plastic viewer in one hand and one eye closed, kept on looping me back to square one. Despite the proliferating superlatives Supercharge (£59.95) is a very nice addition to Superbasic and offers machine code speed to QL owners without the need to learn assembly language or high level languages for other compilers.

+ + + + + +

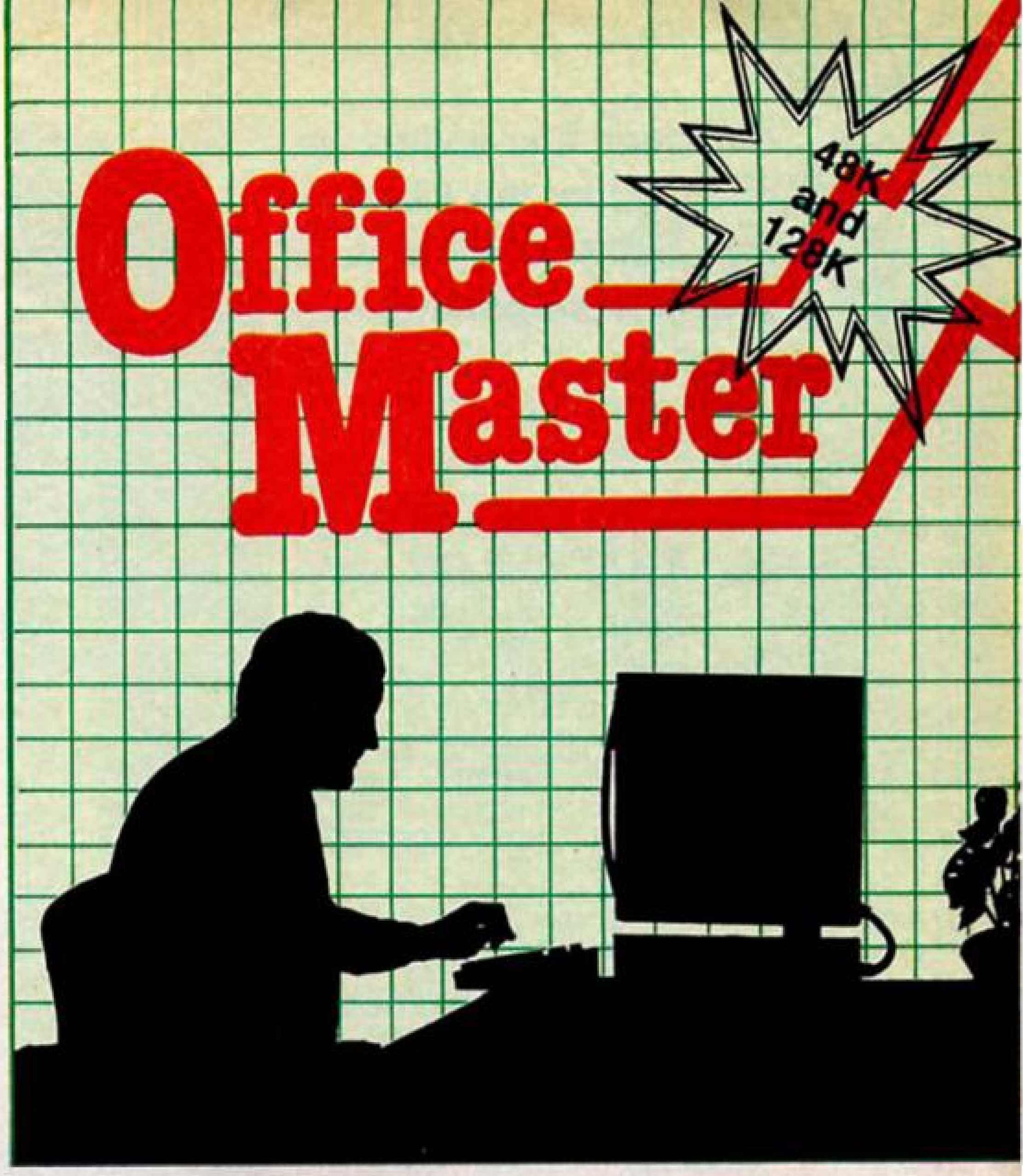
If there were a prize for the least visited stand at ZX Microfairs, February's would probably have gone to Prospero Software. The company was there to promote its newly released QL Fortran-77 compiler. Selling at £99.95, the Prospero package is the first full QL implementation of Fortran-77 but number-crunching was clearly not an overriding priority among the visiting throngs of game-freaks. Again, this package has a couple of apparent minor teething bugs but it looks like an excellent product and one which the QL needs if it is ever to take off in the serious computing side of the micro-market.

Brian Beckett

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QL SOFTWARE

Not much has been released for the QL of late, but what there is seems to be getting better. . .

One or two new names have appeared on the QL scene lately, and it looks as if the software these companies are producing is at last making good use of the machine, rather than simply churning out conversions of old arcade games.

At the last Microfair a company called Datalink (Wales) had a stand where they were selling copies of a game called **3D Slime.** You could describe this as a version of Pacman, but with a difference. As the title implies, it's all in 3D. You control a vicious lump of slime that makes its way through a number of screens situated inside a pyramid. Each of these locations is represented in excellent 3D graphics looking a bit like the arcade game Crystal Castle, with doorways, ramps and pillars to manoeuvre across, and the movement of your little slime creature is very well animated as he shlurps his way around the rooms. Because of its similarity to Pacman this can't really be called an original game, but the implementation is very novel and at long last gives the QL an arcade game that doesn't look like a ZX81 left-over. At £12.95 this is possibly the best arcade game currently available.

On a recent visit to the ZX offices Hamish from Datalink also showed us a not quite finished copy of **QL Pencil,** their next QL program, a graphics utility based on the Macintosh's system of graphics. For some reason the only software that the QL isn't short of is graphics packages, but this looked like it would be a welcome addition to what is already available. Icon driven, it looks like it could compete with Sinclair's own QL Paint but will probably be a bit easier to use and cheaper too. Hopefully we'll be able to give it a full review next month.

QL Wobblevision

French software house Pyramide are about to release some of their QL programs onto the UK market, the first being something of a novelty. **Wanderer,** as it's called, comes complete with cardboard glasses just like the ones you get if you've ever been to a see a 3D film. The plot is a bit odd, the main task being to rescue your landlady's cat (see I told you it was odd).

It seems that there's a game of interstellar poker being played by all the planets in the galaxy and the main units of currency in this game are cats, which is why thousands of cats have gone missing from all over the galaxy, catnapped by the ruler of the universe, The Sphinx.

Wanderer is similar in many ways to Elite — there are the same space combat and navigation sequences, but the



trading elements have been replaced by the poker game in which you have a chance of gaining access to the Sphinx's ship. But of course a lot depends on what you think of the 3D effect. Personally I found that this worked well in the outer space sequences and helped to

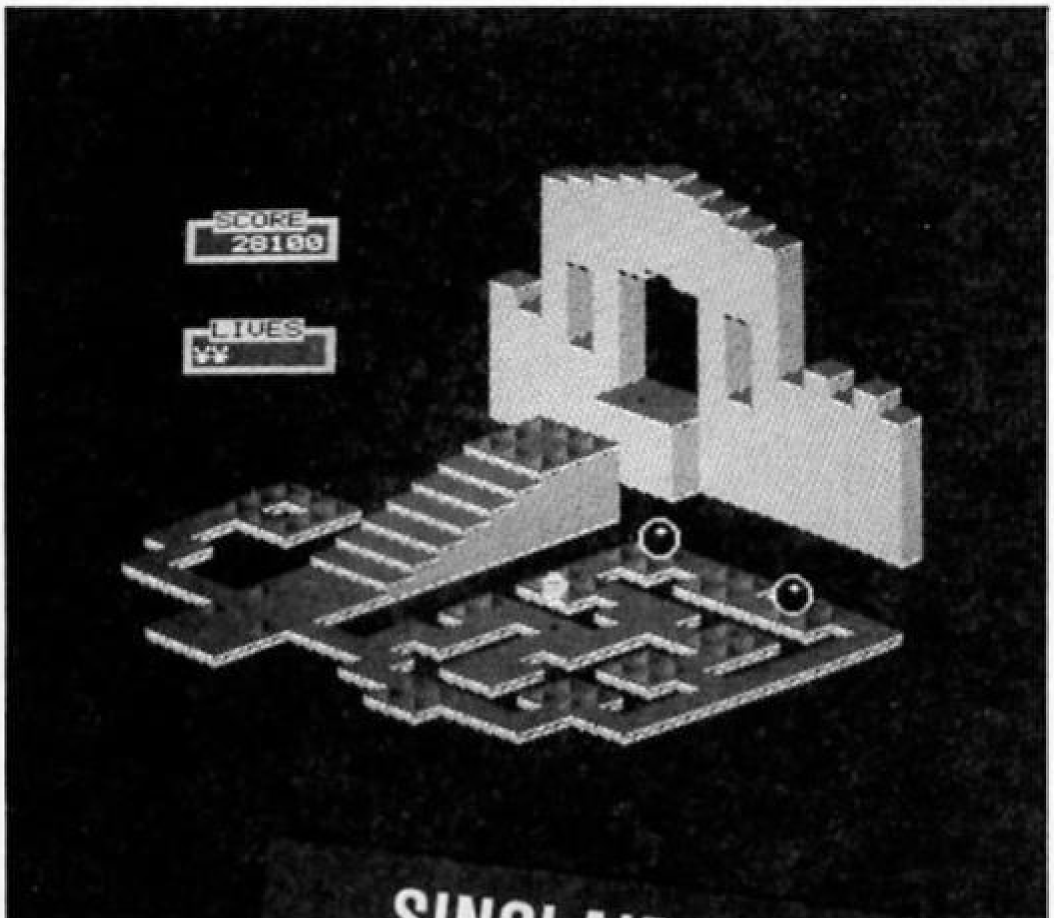
create a suitably 'spacy' atmosphere, but that it didn't really add much to the poker section of the game, since this is less interesting graphically regardless of whether it's in 3D or not. Still, Wanderer is undoubtedly one of the best games yet released for the QL, though I can't help thinking that £19.95 is a bit steep even for 3D graphics.

QL Scrabble

Psion produced an excellent version of **Scrabble** for the Spectrum a couple of years ago, and now Leisure Genius have produced one for the QL. The game itself is almost identical to Psion's Spectrum version though the extra memory has allowed the programmers to cram around 20,000 words into the QL, which gives it a huge vocabulary to play with.

Up to four players can take part and the computer can control any or all of these, playing on any of eight skill levels. I found that the first couple of levels weren't that hard to keep up with, but on higher levels its ability to create words like oojimaflip with incredibly high scores looks suspiciously like cheating to me.

Graphically, the layout of the board and letter racks is clear and quite colourful and the option which allows you to watch the computer 'thinking', as it tries out different words on the board is fascinating to watch. Personally I'd rather play Scrabble lying on the floor with a packet of biscuits but there's no denying that this is one game that does the QL justice for a change.



3D Slime



QL Flight Simulator

Very much like a Government Health Warning on a cigarette packet, the manual to this piece of software declares 'QL Flight is not a game, and has not been written to be a game'! And true to that promise, **QL Flight** is an attempt to bring as much realism to actual flight as is capable by the QL.

For £19.95, the purchaser will obtain the software on a single microdrive cartridge and a 30 page manual. It can easily be believed that both the software and manual were written by an aeronautical expert. Like many experts, the author of this manual has not fully appreciated what is simple to him might be very confusing for the complete beginner. There is a short step-by-step sequence towards the back of the manual, which takes the beginner through a simple flight. But it takes many hours of practise just to achieve this; and that's before anything moderately complex is attempted.

Within the limits of the QL's graphics capabilities, 'QL Flight' from Microdeal does produce some good effects. All scenes are line drawings, and there is some flicker between frames, but, with some imagination, the scenes presented, and the operation of the aircraft are quite believable. From taxiing to take-off, then controlled flight, landing and re-fuelling, everything is realistic.

There is also a choice of 'worlds' (countries would be more accurate) and weather conditions. The complex operation of the aircraft requires almost half of the keys on the keyboard to have some specific operation, all of which have to be learnt and mastered for successful flight.

If you have never flown an aircraft, several hours with this simulator will give you some appreciation of what it is really like.

Assembly listing for the new keywords.

```
00000                          * Sound Command Keywords
00000                          * (c)  C.I.Barter  9/12/85
00000                          * Routine to link in keywords
00000 43FA000C                         LEA     PRDEF,A1
00004 34780110                         MOVE.W  $110,A2
00008 4E92                             JSR     (A2)
0000A 7000                             MOVEQ   #0,D0
0000C 4E75                             RTS
0000E                          * Keyword definition block
0000E 0009                     PRDEF   DC.W    9
00010 0058                             DC.W    $58
00012 05534F554E44                     DC.B    5,'SOUND'
00018 005A                             DC.W    $5A
0001A 07504954434805F31                DC.B    7,'PITCH_1'
00022 0060                             DC.W    $60
00024 07504954434805F32                DC.B    7,'PITCH_2'
0002C 0066                             DC.W    $66
0002E 08535445505F494E5400             DC.B    8,'STEP_INT',0
00038 0064                             DC.W    $64
0003A 0454494D4500                     DC.B    4,'TIME',0
00040 0066                             DC.W    $66
00042 06505F5354455000                 DC.B    6,'P_STEP',0
0004A 0066                             DC.W    $66
0004C 045752415000                     DC.B    4,'WRAP',0
00052 0068                             DC.W    $68
00054 0452414E4400                     DC.B    4,'RAND',0
0005A 006A                             DC.W    $6A
0005C 0446555A5A00                     DC.B    4,'FUZZ',0
00062 000000000000                     DC.W    0,0,0
00068                          * Send command to IPC
00068 7011                     SOUND   MOVEQ   #$11,D0
0006A 47FA009C                         LEA     PARAM,A3
0006E 4E41                             TRAP    #1
00070 4E75                             RTS
00072                          * Set pitch one
00072 615C                     PIT1    BSR.S   CHECK
00074                          * Add one to parameter to make usage
00074                          * consistent with SuperBasic BEEP
00074 063600019800                     ADDI.B  #1,0(A6,A1.L)
0007A 377698000006                     MOVE.W  0(A6,A1.L),6(A3)
00080 604A                             BRA.S   END
00082                          * Set pitch two
00082 614C                     PIT2    BSR.S   CHECK
00084                          * Add one to parameter to make usage
00084                          * consistent with SuperBasic BEEP
00084 063600019800                     ADDI.B  #1,0(A6,A1.L)
0008A 377698000008                     MOVE.W  0(A6,A1.L),8(A3)
00090 603A                             BRA.S   END
00092                          * Set Interval for pitch steps
00092 613C                     PINT    BSR.S   CHECK
00094 37769800000A                     MOVE.W  0(A6,A1.L),10(A3)
0009A 6030                             BRA.S   END
0009C                          * Set duration of sound
0009C 6132                     TIME    BSR.S   CHECK
0009E 37769800000C                     MOVE.W  0(A6,A1.L),12(A3)
000A4 6026                             BRA.S   END
000A6                          * Set pitch gradiant
000A6 6128                     PSTEP   BSR.S   CHECK
000A8 37769800000E                     MOVE.W  0(A6,A1.L),14(A3)
000AE 601C                             BRA.S   END
000B0                          * Set wrap
000B0 611E                     WRAP    BSR.S   CHECK
000B2 377698000010                     MOVE.W  0(A6,A1.L),16(A3)
000B8 6012                             BRA.S   END
000BA                          * Set randomness
000BA 6114                     RAND    BSR.S   CHECK
000BC 377698000012                     MOVE.W  0(A6,A1.L),18(A3)
000C2 6008                             BRA.S   END
000C4                          * Set fuzz
000C4 610A                     FUZZ    BSR.S   CHECK
000C6 377698000014                     MOVE.W  0(A6,A1.L),20(A3)
000CC                          * Normal return to Basic
000CC 7000                     END     MOVEQ   #0,D0
000CE 4E75                             RTS
000D0                          * Subroutine to check parameters.
000D0                          * It returns with integer on RI stack
000D0                          * Store subroutine return address in
000D0                          * case of early return to Basic.
000D0 45FA0032                 CHECK   LEA     RBUFF,A2
000D4 249F                             MOVE.L  (A7)+,(A2)
000D6                          * Check for no parameters
000D6 BBCB                             CMPA.L  A3,A5
000D8 6726                             BEQ.S   BPERR
000DA 34780112                         MOVE.W  $112,A2
000DE 4E92                             JSR     (A2)
000E0                          * Check only one parameter
000E0 0C430001                         CMPI.W  #1,D3
000E4 661A                             BNE.S   BPERR
000E6 45FA001C                         LEA     RBUFF,A2
000EA 2F12                             MOVE.L  (A2),-(A7)
000EC                          * Reverse parameter word on RI stack
000EC 45F69800                         LEA     0(A6,A1.L),A2
000F0 122A0001                         MOVE.B  1(A2),D1
000F4 E149                             LSL.W   #8,D1
000F6 1212                             MOVE.B  (A2),D1
000F8 3481                             MOVE.W  D1,(A2)
000FA                          * Put Params address in A3 ready to use
000FA 47FA000C                         LEA     PARAM,A3
000FE 4E75                             RTS
00100                          * Bad Parameters ending
00100 70F1                     BPERR   MOVEQ   #-15,D0
00102 4E75                             RTS
00104                          * Long word to hold subroutine
00104                          * return address
00104                          RBUFF   DS.L    1
00108                          * The command string to be sent
00108                          * to the IPC using TRAP #1, D0=$11
00108 0A                       PARAM   DC.B    $A
00109                          * Number of parameter bytes
00109 10                               DC.B    16
0010A                          * Specify how much of each byte to send
0010A 4444AA66                         DC.L    $4444AA66
0010E                          * The actual sound parameters
0010E                          * Note that bits are sent in low-high
0010E                          * order hence words were reversed in
0010E                          * the parameter fetching routine and
0010E                          * default pitch and duration words are
0010E                          * here put in LSB-MSB order.
0010E 34                               DC.B    52
0010F 00                               DC.B    0
00110 0000                             DC.W    0
00112 0000                             DC.W    0
00114 00                               DC.B    0
00115 C8                               DC.B    200
00116 0000                             DC.W    0
00118 0000                             DC.W    0
0011A 0000                             DC.W    0
0011C 0000                             DC.W    0
0011E                          * Reply expected
0011E 01                               DC.B    1
0011F                                  END
```

SOUND ADVICE

Fed up with the QL's BEEP? Chris Baxter can provide you with nine new commands for handling sounds.

The QL's sound generator is capable of a surprising range of sounds, although the generation of a given tone never seems particularly easy. This is not helped by the BEEP command's rather complicated format which may require up to eight parameters. The routine given below in assembler and as a SuperBasic loader splits the issuing of such commands into separate keywords making experimentation much easier.

The routine begins by linking nine new keywords into SuperBasic. These keywords are largely self-explanatory but a little guidance is useful. A parameter block is set up which holds the bits that will be sent to the Intelligent Peripheral Controller (the QL has two processors and this is the one that looks after sound); it is this parameter block which the new commands will alter. The block is set up with default values (which can be altered, of course). The parameters in this block are not in the same order as in the BEEP command, however, and not all of every parameter byte is sent to the IPC. If in doubt about the function or range of a parameter, remember that they are similar to their BEEP counterparts and you can check them in the manual.

The first eight keywords invoke a routine to fetch one integer parameter. This parameter has to have its two bytes reversed, as a word is stored as a Most Significant then a Least Significant byte and when moving through the parameter table the IPC will require bits in ascending order. This word is then stored at the appropriate place in the parameter table. The final command SOUND smply uses a TRAP # 1 instruction to send the data in the parameter table to the IPC to make the sound. The one that is added to the pitch specifiers PITCH_1 and PITCH_2 is simply to make the pitch given by that parameter the same as would be given by the BEEP command. Interestingly, the subroutine CHECK stores its return address at RBUFF as if there is an error and as it has to return to Basic early the correct address would not have been at the bottom of the stack to make a good return. (A branch to a subroutine stores its return address on the A7 stack too.) Don't forget that to kill a sound you just issue the BEEP command with no parameters.

New keywords

PITCH_1 will set the basic pitch of the note.
PITCH_2 will set the second pitch that the note can 'bounce' to from the first pitch.
TIME will set the duration of the sound.
STEP_INT will specify the time interval between steps in pitch which can be set by:
P_STEP which gives the change in pitch for each step between pitches one and two.
WRAP sets the number of times the sound will wrap rather than bounce between the pitch levels.
RAND sets the random element in the sound making.
FUZZ sets the fuzziness of the sound produced.
SOUND actually initiates the sound that has been set up in the parameter block.

Basic Loader with m/c as Data statements.

```
100 REMark Sound Command Generator
110 REMark C.I.Baxter 10/12/1985
120 SAVE mdv1_sound_bas
130 a=RESPR(290)
140 RESTORE 1000
150 FOR i=a TO a+289 STEP 10
160 check=0
170 FOR h=0 TO 9
180 READ byte
190 check=check+byte
200 POKE i+h,byte
210 END FOR h
220 READ byte_check
230 IF byte_check<>check:PRINT"Error in data line ";i-a+1000:STOP
240 END FOR i
250 SBYTES mdv1_sound_mac,a,288
260 CALL a
270 STOP
1000 DATA 67,250,0,12,52,120,1,16,78,146,742
1010 DATA 112,0,78,117,0,9,0,88,5,83,492
1020 DATA 79,85,78,68,0,90,7,80,73,84,644
1030 DATA 67,72,95,49,0,96,7,80,73,84,623
1040 DATA 67,72,95,50,0,102,8,83,84,69,630
1050 DATA 80,95,73,78,84,0,0,100,4,84,598
1060 DATA 73,77,69,0,0,102,6,80,95,83,585
1070 DATA 84,69,80,0,0,102,4,87,82,65,573
1080 DATA 80,0,0,104,4,82,65,78,68,0,481
1090 DATA 0,106,4,70,85,90,90,0,0,0,445
1100 DATA 0,0,0,0,112,17,71,250,0,156,606
1110 DATA 78,65,78,117,97,92,6,54,0,1,588
1120 DATA 152,0,55,118,152,0,0,6,96,74,653
1130 DATA 97,76,6,54,0,1,152,0,55,118,559
1140 DATA 152,0,0,8,96,58,97,60,55,118,644
1150 DATA 152,0,0,10,96,48,97,50,55,118,626
1160 DATA 152,0,0,12,96,38,97,40,55,118,608
1170 DATA 152,0,0,14,96,28,97,30,55,118,590
1180 DATA 152,0,0,16,96,18,97,20,55,118,572
1190 DATA 152,0,0,18,96,8,97,10,55,118,554
1200 DATA 152,0,0,20,112,0,78,117,69,250,798
1210 DATA 0,50,36,159,187,203,103,38,52,120,948
1220 DATA 1,18,78,146,12,67,0,1,102,26,451
1230 DATA 69,250,0,28,47,18,69,246,152,0,879
1240 DATA 18,42,0,1,225,73,18,18,52,129,576
1250 DATA 71,250,0,12,78,117,112,241,78,117,1076
1260 DATA 0,0,0,0,10,16,68,68,170,102,434
1270 DATA 52,0,0,0,0,0,0,200,0,0,252
1280 DATA 0,0,0,0,0,0,1,0,0,0,1
```

QL SuperB

Part 2: Procedures and Functions.

Without doubt, one of the main attractions of SuperBASIC is the utility which allows programmers to create their own commands and functions. This is not to say that there aren't enough in ROM already, but through PROCEDURES and FUNCTIONS the programmer can create specialist commands which can be used in one program, or several.

Although it is fundamental to the language of BASIC, there is often some confusion about the difference between commands and functions. So, in case you're not sure, let's clear this up before we go any further. A function is easier to define; it takes one or more variables (numbers or strings) and converts them into a single output, which is also a number or string. A command is far more flexible. It may (or may not) have one or more 'inputs', which can be numeric and/or string variables, or constants. The result of a command cannot be a single variable (otherwise it will be a function), but it can be just about anything else; something happening on the screen, printer, microdrive, or to variables, etc. SuperBASIC uses the DEFine PROCedure and DEFine FUNCtion commands to create new commands and functions.

As a simple example, take a look at the listing in fig.1. The program defines a single command called 'TIMES', and a function called 'FREE_MEMORY'. Note their structures; DEFine PROCedure and DEFine FUNCtion mark the start of both of them, and END DEFine signifies the end of their definitions.

The Times

The TIMES command prints the times table of any number given. The 'x' in the bracket after 'TIMES' signifies that the procedure requires a single numeric value to be passed to it; this value is the times table required. In line 20 you'll see a LOCAL command. This is used to define variables which are used by the procedure 'TIMES', and which cannot be used by any other part of the program. TIMES has only one defined local numeric variable; 'i'. The variable 'x' is also local, but must not be defined as local; it is local by implication, as it appears in the defined name.

It is the facility to have local variables which give procedures and functions a distinct advantage over subroutines. In the same way that, for example, you don't have to know how the PRINT routine works in ROM to make use of that routine in BASIC, you don't have to know how a well written procedure or function works. All you should need to know is the input values required, and the expected result; the same applies to all SuperBASIC commands and functions.

To get the 'TIMES' command and 'FREE_MEMORY' function to work, simply enter the listing in fig.1. First try the direct command RUN. You'll find that nothing happens; defined commands and functions cannot be RUN in the same way as normal BASIC program lines. Now type in as a direct command TIMES 3; you should get the three times table printed. While these program lines remain active in the computer's memory, the TIMES command works in the same way as any other command. You can use it as a direct command (as just described), or use it in a program. Add the following few lines, then RUN the program:

```
1000 FOR i=1 TO 5
1010 TIMES i
1020 a$= INKEY$ (-1)
1030 END FOR i
```

First of all, the RUN command ignores the defined procedure and function, and goes straight to the first program line outside of any defined area. In the FOR..END FOR loop, the TIMES command is executed five times. Note that in this program, the variable 'i' is passed to the command TIMES. For its own use, this variable 'i' is converted by the TIMES procedure to the local variable 'x'. The TIMES procedure has its own local 'i' variable; this is quite separate from the 'i' variable in lines 1000 to 1030. This is an important principle of local variables; a variable of exactly the same name can be local to one procedure and also exist as a local variable in other defined procedures and functions, or be a variable in the main body of a program. Yet again, this highlights the independent nature of a defined procedure or function.

So far we haven't used the new function FREE_MEMORY. This works by PEEKing the values of two system variables, and subtracting these values, to obtain the amount of used RAM. While it has no values passed to it, this function has only one output; the value of the subtraction. Therefore, it obeys the earlier definition of a function. The output of the function is returned by simply using the RETurn command in the definition. Try the direct command: **PRINT FREE_MEMORY.**

This should display on the screen the amount of unused RAM. Use a little memory with the RESPR function (e.g. as a direct command 'a= RESPR (1000)'), and then type in **PRINT FREE_MEMORY** again, just to show that it really works!

GoSubs

So now you have the basic principles of defined procedures and functions. You should also appreciate the distinct advantage that defined commands have over subroutines; they can be used in exactly the same way as in-built

commands, and have the same degree of independence.

Another comparison with subroutines that is worth testing is where the definitions should go in a program. For the vast majority of microcomputers using BASIC, when you use a GOTO or GOSUB, the routine in ROM has to search from the beginning of the program until it finds the appropriate line to GOTO or GOSUB. In practise this means that if you put all your subroutines at the end of a program, it will run more slowly than putting them all at the beginning. The QL is no exception to this rule. But does the same apply to defined commands?

You can test this for yourself with the program in fig.2. The program is an automatic line generator. SuperBASIC programs are stored on microdrive as an ASCII file. Therefore, if you create a file with the correct format, you can LOAD and RUN it as a SuperBASIC program. The program in fig.2 does just that. It allows you to create a program on microdrive which, if you want, will fill RAM with program lines (simple REPeat loops), placing a defined procedure either at the end or beginning of the program. From within each loop, the defined procedure is used. If defined commands work the same as subroutines, then, as you increase the length of a

ASIC

program, the time taken for the program to be completed will start to differ significantly depending on whether the definition appears at the beginning or end of the program.

To try this, type in the program lines in fig.2, then SAVE the program on a blank, formatted cartridge in drive 2. RUN the program. You get two questions; the number of loops and whether to place the procedure at the beginning or end of the program (press 'f', for first, or 'e' for end). With these selections

Fig.1. Examples of a Defined Procedure and Function

```
10 DEFine PROCedure TIMES (x)
20 LOCal i
30 CLS
40 FOR i=1 TO 12
50    IF i<10 THEN PRINT " ";
60    PRINT i;" x ";x;" = ";i*x
70 END FOR i
80 END DEFine TIMES
90 :
110 DEFine FuNction FREE_MEMORY
120 RETurn PEEK_L (163856)-PEEK_L (163852)
130 END DEFine FREE_MEMORY
```

Fig.2. Program generator

```
10 REMark program generator
20 l=1/***         30 CLS#0: INPUT #0,' Enter the number of loops ';x
40 REPeat loop
50    INPUT #0,"Place proc. first or at end (f/e)? ";x$
60    IF x$='e' OR x$='f' THEN EXIT loop
70 END REPeat loop
80 a$='mdv2_prog_'&x$&x&'_bas'
90 DELETE a$: OPEN_NEW #4,a$
100 IF x$='f' THEN create_proc
110 a$=l&' POKE_W 163886,0'
120 create
130 FOR i=1 TO x
140    a$=l&' x=0': create
150   a$=l&' count=0': create
160   a$=l&' REPeat loop_'&i: create
170   a$=l&' CALC': create
180   a$=l&' count=count+1: IF count>20 THEN EXIT loop_'&i:
create
190   a$=l&' END REP loop_'&i: create
200 END FOR i
210 a$=l&' a= PEEK_W (163886)': create
220 a$=l&' PRINT "Time = ";a/50;" seconds"': create
230 IF x$='e' THEN create_proc
240 DEFine PROCedure create_proc
250 a$=l&' DEF PROCedure CALC': create
260 a$=l&' g=1*2/3': create
270 a$=l&' END DEFine CALC': create
280 END DEFine create_proc
290 DEFine PROCedure create
300 l=l+1: PRINT #4,a$
310 END DEFine create
320 CLOSE #4
```

made, a program is created on microdrive 2. The name of the program depends on the selections made. For 10 loops, with the procedure first, the name is 'prog_f10_bas'; for 100 loops, with the procedure last, the name is 'prog_e100_bas'. Run the program generator several times, selecting loops of between 10 and 250, in each case putting the procedure at the beginning and at the end.

Before going on to try the generated programs, there is one final principle of defined procedures which is exemplified by the program generator. Note that the string variable a$ is used by the procedure 'create' without being passed to it. a$ is not local to any procedure; it's called a global variable, and may be used, or modified, by any procedure or function. Any variable not defined as local (or implicit as local by being part of the defined name) is assumed to be global by a defined procedure or function.

Now, onto the created programs. These may be loaded and run in the usual way (e.g. lrun mdv2_prog_f10_bas). The first action of the program is to set the frame counter to zero. As this frame counter increments 50 times each second, it can be used to determine the running time of the program; the final action of the program is to PEEK the frame counter, and print its value, divided by 50, to give you the running time in seconds. In between, the program goes through the preset number of loops, each time calling the delaying procedure called CALC.

You can come to your own conclusion about the effect of procedure position (results next month). But one interesting finding should be the effect of program length on running time. If you divide the total time by

the number of loops, then you'll get the average time per loop. You'll note that, as the program length increases, the average time per loop gets longer. As each loop is exactly the same, the conclusion must be that SuperBASIC gets slower as the program length increases. The QL is not unique in this respect, but it was one of the pre-launch promises that this slowing down with program length would not happen; another broken promise!

Earlier, I pointed out that one of the strong features of defined commands was the possibility of transferring new commands from one program to another. The listing in fig.3 should bear that out. This listing contains almost all of the procedures necessary for a typing tutor program developed by the author. All the procedures are listed in fig.4; this gives the procedure name, the input variables, and the effect of each procedure. There are three global variables; integer arrays a% and b%, and a name string array, z$. Apart from that, all variables are local. To complete the typing tutor program, you can either wait for the linking routines next month, or write your own. Remember, you can treat all the new commands as SuperBASIC commands, so once you are familiar with what they do, there should be nothing to prevent you writing a custom made typing tutor.

Typing tutor

The first procedure in the keyboard program (line 10 to 50) is simply called 'sa'. Its purpose is quite simple; by typing in 'sa' as a direct command, the current version of the program is saved on microdrive 1. With a really long program, such as the keyboard program, it will take some time to type into your QL. The last thing you would want to happen is to get close to the end, and have a power surge, crash your computer and wipe out hours of work. As a golden rule, always save the program you are working on every ten to fifteen minutes, or risk losing it all! The 'sa' routine encourages that; rather than type: DELETE mdv1_keyboard: SAVE mdv1_keyboard as a direct command every time you save the latest version, you just type it once, as a procedure, then type 'sa' to achieve the same thing.

Fig.4 lists all the procedures in the keyboard routine, what they do, and the variables passed to them. The important procedures for your own programs, are 'init', which sets the whole thing up, 'which_key', which changes the colour of a key for a desired

Fig.3. Keyboard Trainer Procedures

```
10 DEFine PROCedure sa
20 DELETE mdv1_keyboard
30 SAVE mdv1_keyboard
40 END DEFine sa
50 REMark ********************
100 DEFine PROCedure test
110 LOCal i,j,x,xx$
120 REPeat loop
130    IF PEEK_W (163976)<>0 THEN POKE_W 163976,0
140    xx$= INKEY$ (-1)
150    x= CODE (xx$)
160    which_key x,2,5,20
180 END REPeat loop
190 END DEFine test
200 REMark ********************
210 :
220 :
230 REMark ********************
10000 DEFine PROCedure init
10010 DIM a%(110,7)
10020 RESTORE 20000
10030 FOR i=1 TO 110
10040   FOR j=1 TO 7
10050   READ a% (i,j)
10060   END FOR j
10070 END FOR i
10080 DIM z$ (14,5), b% (14,2)
10090 FOR i=1 TO 14
10100   READ z$(i), b% (i,1), b% (i,2)
10110 END FOR i
10120 k: upper_case
10130 END DEFine init
10140 REMark ********************
10150 DEFine PROCedure arrow (t,x,y)
10160 POINT x,y: TURNTO t
10170 PENDOWN
10180 MOVE 5: TURN 90
10190 MOVE 3: TURN 225
10200 MOVE 6: TURN 270
10210 MOVE 6: TURN 225
10220 MOVE 3: TURN 90
10230 MOVE 5: TURN 270
10240 MOVE 3: PENUP
10250 END DEFine arrow
10260 REMark ********************
10270 DEFine PROCedure all_arrows
10280 arrow 180,65,8
10290 arrow 0,74,10
10300 arrow 90,222,4
10310 arrow 270,242,13
10320 END DEFine all_arrows
10330 REMark ********************
10340 DEFine PROCedure which_key (y,i,p,delay)
10350 LOCal x,z,shift,j,off
10360 shift=0: INK i: x=y
10370 SELect ON x
10380 =33 TO 38,40 TO 43,58,60,62 TO 90,94,95,123 TO 127,252
10390 IF x=252 THEN
10400     key_colour 105,i,p: shift=1
10410     ELSE
10420     IF a%(x-31,3)<222 THEN
10430         key_colour 106,i,p: shift=2
10440         ELSE : key_colour 105,i,p: shift=1
10450     END IF
10460 END IF
10470 END SELect
10480 SELect ON x
10490 =252: key_colour 1,i,p: off=1
10500 =32 TO 127: key_colour x-31,i,p: off=x-31
10510 =27: off=96: key_colour off,i,p
10520 =232,236,240,244,248: off=x/4+39:key_colour off,i,p
10530 =234,238,242,246,250
10540   key_colour 106,i,p: shift=2
10550   off=(x-2)/4+39: key_colour off,i,p
10560 =9: key_colour 103,i,p: off=103
10570 =253: key_colour 106,i,p
10580      shift=2: key_colour 103,i,p: off=103
10590 =10: key_colour 107,i,p: key_colour 108,i,p: off=107
10600 =254: shift =1
10610   FOR j=105,107,108: key_colour j,i,p: END FOR j:
off=107
10620 =228: shift=2
10630   FOR j=106,104: key_colour j,i,p: END FOR j: off=104
10640 =192: BLOCK 26,24,86,96,p: arrow 180,65,8: off=111
10650 =196: shift=2: key_colour 106,i,p
10660   BLOCK 26,24,86,96,p: INK i: arrow 180,65,8: off=111 ▶▶▶
```

time, and 'key_colour' which changes a key colour (coded by the array a%) to a selected ink and paper combination.

To allow you to try out the program, there is a 'test' procedure which responds to your keypress, and highlights that key on the screen. Once you have typed all of the listing in fig.3 into your QL and saved it, type as direct commands 'init' and 'test'. There is a short delay with init (as the arrays are filled), then you should get the image of the QL keyboard on your screen. Try typing in a few letters, and watch the screen respond by 'highlighting' the keys you pressed. The routine doesn't yet work for CAPS LOCK, CTRL, ALT, and SHIFT (by itself) — you'll have to wait for next month's ZXC for that! But, if you can't wait, then why not try writing your own procedures, and linking routines, to produce your very own typing tutor.

David Nowotnik

```
10670 =200: BLOCK 28,24,114,96,p: arrow 0,74,10: off=112
10680 =204: shift=2: key_colour 106,i,p
10690   BLOCK 28,24,114,96,p: INK i: arrow 0,74,10: off=112
10700 =208: BLOCK 28,24,346,96,p: arrow 90,222,4: off=113
10710 =212: shift=1: key_colour 105,i,p
10720   BLOCK 28,24,346,96,p: INK i: arrow 90,222,4: off=113
10730 =216: BLOCK 26,24,376,96,p: arrow 270,242,13: off=114
10740 =220: shift=1: key_colour 105,i,p
10750   BLOCK 26,24,376,96,p: INK i: arrow 270,242,13:
off=114
10760 = REMAINDER : off=0
10770 END SELect
10780 FOR j=1 TO 10*delay: END FOR j
10790 INK 7: PAPER 0
10800 IF shift THEN
10810   IF shift =1 THEN
10820      key_colour 105,7,0
10830      ELSE : key_colour 106,7,0
10840   END IF
10850 END IF
10860 SELect ON off
10870 =1 TO 33,60 TO 65,92 TO 106,109,110
10880  key_colour off,7,0
10890 =107: key_colour 107,7,0: key_colour 108,7,0
10900 =34 TO 59
10910   IF case=1 THEN
10920   key_colour off,7,0
10930   ELSE : key_colour off+32
10940   END IF
10950 =66 TO 91
10960   IF case=0 THEN
10970   key_colour off,7,0
10980   ELSE : key_colour off-32,7,0
10990   END IF
11000 =111: BLOCK 26,24,86,96,0: arrow 180,65,8
11010 =112: BLOCK 28,24,114,96,0: arrow 0,74,10
11020 =113: BLOCK 28,24,346,96,0: arrow 90,222,4
11030 =114: BLOCK 26,24,376,96,0: arrow 270,242,13
11040 END SELect
11050 END DEFine which_key
11060 REMark ********************
11070 DEFine PROCedure k
11080 LOCal i
11090 MODE 8: CSIZE 0,0
11100 WINDOW #2,512,204,0,0
11110 PAPER #2,4: CLS #2
11120 WINDOW 480,120,15,60
11130 PAPER 0: INK 1: CLS
11140 FOR i=20 TO 80 STEP 20
11150   LINE 0,i TO 281,i
11160 END FOR i
11170 FOR i=20 TO 272 STEP 18
11180   LINE i,80 TO i,102
11190 END FOR i
11200 LINE 20,0 TO 20,80
11210 FOR i=47 TO 281 STEP 18
11220   LINE i,60 TO i,80
11230 END FOR i
11240 LINE 281,0 TO 281,80 TO 300,80
11250 FOR i=52 TO 250 STEP 18
11260   LINE i,40 TO i,60
11270 END FOR i
11280 FOR i=61 TO 241 STEP 18
11290     LINE i,20 TO i,40
11300 END FOR i
11310 FOR i=52,70,88,214,232,250
11320   LINE i,0 TO i,20
11330 END FOR i
11340 INK 0: LINE 264,60 TO 281,60
11350 RESTORE 11380: INK 7
11360 END DEFine k
11370 REMark ********************
11380 DEFine PROCedure upper_case
11390 LOCal i
11400 FOR i=1 TO 65,92 TO 96
11410   CURSOR a%(i,5),a%(i,6)
11420   PRINT CHR$ (i+31)
11430 END FOR i
11440 spec_keys: all_arrows: case=1
11450 END DEFine upper_case
11460 REMark ********************
11470 DEFine PROCedure lower_case
11480 LOCal i
11490 FOR i=1 TO 33,60 TO 96
11500   CURSOR a%(i,5),a%(i,6)
11510   PRINT CHR$ (i+31)
11520 END FOR i
11530 spec_keys: all_arrows: case=0
11540 END DEFine lower_case
11550 REMark ********************
11560 DEFine PROCedure spec_keys
11570 LOCal i
11580 FOR i=1 TO 14
11590   outer_key (i)
11600 END FOR i
11610 END DEFine spec_keys
11620 REMark ********************
11630 DEFine PROCedure outer_key (y)
11640 LOCal x$,x
11650   CURSOR a%(y+96,5),a%(y+96,6)
11660   x$="": x=1
11670   REPeat mm
11680     IF x>5 THEN EXIT mm
11690     IF z$(y,x)=" " THEN EXIT mm
11700     x$=x$&z$(y,x): x=x+1
11710   END REPeat mm
11720   PRINT x$
11730 END DEFine outer_key
11740 REMark ********************
11750 DEFine PROCedure key_colour (no,i,p)
11760 LOCal x
11770 INK i: PAPER p
11780 BLOCK a%(no,1),a%(no,2),a%(no,3),
      a%(no,4),p
11790 IF no<97 THEN
11800   CURSOR a%(no,5),a%(no,6)
11810   PRINT CHR$ (no+31)
11820   IF no=96 THEN outer_key (6): END IF
11830   ELSE
11840   outer_key (no-96)
11850   IF no=107 THEN outer_key (12):
        END IF
11860   IF no=108 THEN outer_key (11):
        END IF
11870 END IF
11880 IF a%(no,7)>0 THEN
11890   x=a%(no,7)-31
11900   CURSOR a%(x,5),a%(x,6)
11910   PRINT CHR$(x+31)
11920 END IF
11930 INK 7: PAPER 0
11940 END DEFine key_colour
11950 REMark ********************
20000 DATA 200,24,144,96,220,104,0
20010 DATA 28,24,62,0,68,2,49
20020 DATA 26,21,376,50,382,50,39
20030 DATA 28,24,120,0,128,2,51
20040 DATA 26,24,150,0,156,2,52
20050 DATA 28,24,178,0,186,2,53
20060 DATA 28,24,236,0,244,2,55
20070 DATA 26,21,376,50,382,60,34
20080 DATA 28,24,294,0,302,2,57
20090 DATA 28,24,324,0,332,2,48
20100 DATA 26,24,266,0,272,2,56
20110 DATA 28,24,382,0,390,2,61
20120 DATA 26,23,304,72,308,82,60
20130 DATA 26,24,354,0,360,12,95
20140 DATA 28,23,332,72,338,84,62
20150 DATA 26,23,362,72,368,84,63
20160 DATA 28,24,324,0,332,12,41
```

▶ ▶ ▶

```
20170 DATA 28,24,62,0,68,12,33
20180 DATA 26,24,92,0,98,12,64
20190 DATA 28,24,120,0,128,12,35
20200 DATA 26,24,150,0,156,12,36
20210 DATA 28,24,178,0,186,12,37
20220 DATA 26,24,208,0,214,12,94
20230 DATA 28,24,236,0,244,12,38
20240 DATA 26,24,266,0,272,12,42
20250 DATA 28,24,294,0,302,12,40
20260 DATA 28,21,346,50,352,50,59
20270 DATA 28,21,346,50,352,60,58
20280 DATA 26,23,304,72,308,74,44
20290 DATA 28,24,382,0,390,12,43
20300 DATA 28,23,332,72,338,74,46
20310 DATA 26,23,362,72,368,74,47
20320 DATA 26,24,92,0,98,2,50
20330 DATA 26,21,86,50,92,56,0
20340 DATA 26,23,216,72,222,80,0
20350 DATA 26,23,158,72,164,80,0
20360 DATA 26,21,144,50,150,56,0
20370 DATA 26,22,136,26,142,32,0
20380 DATA 28,21,172,50,178,56,0
20390 DATA 26,21,202,50,208,56,0
20400 DATA 28,21,230,50,236,56,0
20410 DATA 28,22,280,26,286,32,0
20420 DATA 26,21,260,50,266,56,0
20430 DATA 28,21,288,50,294,56,0
20440 DATA 26,21,318,50,324,56,0
20450 DATA 26,23,274,72,280,80,0
20460 DATA 28,23,244,72,250,80,0
20470 DATA 26,22,310,26,316,32,0
20480 DATA 28,22,338,26,344,32,0
20490 DATA 26,22,78,26,84,32,0
20500 DATA 28,22,164,26,171,32,0
20510 DATA 28,21,114,50,120,56,0
20520 DATA 26,22,194,26,202,32,0
20530 DATA 26,22,252,26,258,32,0
20540 DATA 28,23,186,72,192,80,0
20550 DATA 28,22,106,26,112,32,0
20560 DATA 28,23,128,72,134,80,0
20570 DATA 28,22,222,26,230,32,0
20580 DATA 26,23,100,72,106,80,0
20590 DATA 26,22,368,26,372,38,123
20600 DATA 40,24,440,0,452,12,124
20610 DATA 28,22,396,26,402,38,125
20620 DATA 26,24,208,0,214,2,54
20630 DATA 26,24,354,0,360,2,45
20640 DATA 26,24,412,0,418,12,126
20650 DATA 26,21,86,50,92,56,0
20660 DATA 26,23,216,72,222,80,0
20670 DATA 26,23,158,72,164,80,0
20680 DATA 26,21,144,50,150,56,0
20690 DATA 26,22,136,26,142,32,0
20700 DATA 28,21,172,50,178,56,0
20710 DATA 26,21,202,50,208,56,0
20720 DATA 28,21,230,50,236,56,0
20730 DATA 28,22,280,26,286,32,0
20740 DATA 26,21,260,50,266,56,0
20750 DATA 28,21,288,50,294,56,0
20760 DATA 26,21,318,50,324,56,0
20770 DATA 26,23,274,72,280,80,0
20780 DATA 28,23,244,72,250,80,0
20790 DATA 26,22,310,26,316,32,0
20800 DATA 28,22,338,26,344,32,0
20810 DATA 26,22,78,26,84,32,0
20820 DATA 28,22,164,26,171,32,0
20830 DATA 28,21,114,50,120,56,0
20840 DATA 26,22,194,26,202,32,0
20850 DATA 26,22,252,26,258,32,0
20860 DATA 28,23,186,72,192,80,0
20870 DATA 28,22,106,26,112,32,0
20880 DATA 28,23,128,72,134,80,0
20890 DATA 28,22,222,26,230,32,0
20900 DATA 26,23,100,72,106,80,0
20910 DATA 26,22,368,26,372,26,91
20920 DATA 40,24,440,0,452,2,92
20930 DATA 28,22,396,26,402,26,93
20940 DATA 26,24,412,0,418,2,96
20950 DATA 26,24,34,0,40,2,0
20960 DATA 30,24,2,0,4,8,0
20970 DATA 30,22,2,26,4,32,0
20980 DATA 30,21,2,50,4,56,0
20990 DATA 30,23,2,72,4,80,0
21000 DATA 30,24,2,96,4,104,0
21010 DATA 26,24,34,0,34,12,127
21020 DATA 43,22,34,26,36,32,0
21030 DATA 50,21,34,50,34,56,0
21040 DATA 64,23,34,72,34,80,0
21050 DATA 62,23,390,72,390,80,0
21060 DATA 26,24,426,26,428,28,0
21070 DATA 48,21,404,50,408,56,0
21080 DATA 50,24,34,96,34,104,0
21090 DATA 48,24,404,96,410,104,0
21100 REMark
21110 DATA "F1",232,234
21120 DATA "F2",236,238
21130 DATA "F3",240,242
21140 DATA "F4",244,246
21150 DATA "F5",248,250
21160 DATA "ES",27,127
21170 DATA "TAB",9,253
21180 DATA "CAPS",8,228
21190 DATA "SHIFT",8,8
21200 DATA "SHIFT",8,8
21210 DATA " ",10,254
21220 DATA "ENT",10,254
21230 DATA "CTRL",8,8
21240 DATA "ALT",8,8
```

Fig.4. New commands created by the keyboard routines.

Procedure	line	Purpose
sa	10	Deletes the program on mdv1, then saves the latest version.
test	100	The test routine
init	10000	The initialise routines; sets up arrays a% (key number, block position, and letter position), z$ (key names), and b% (outer key codes), then calls commands 'k' and 'upper_case'.
arrow (t,x,y)	10150	Draws and arrow in direction t, starting at coordinates x,y.
all_arrows	10270	Draws the arrows on all cursor keys.
which_key (x,i,p,delay)	10340	Highlights a key of CODE=x (switching on shift if appropiate) in ink i and paper p, with a delay, before returning to a white on black key.
k	11070	Sets the main window, and draws the keyboard outline.
upper_case	11380	Puts the upper case letters on the screen keyboard, including the 'special' keys, and arrows.
lower_case	11470	As upper_case, but puts lower case letters on the screen keys.
spec_keys	11560	Puts the names (in z$ array) on 'outer' keys.
outer_key (y)	11630	Puts the name on one 'outer' key (y=1 to 14).
key_colour (no,i,p)	11750	Changes the colour of key number 'no' (array a%) to paper p and ink i.

ACROSS THE POND

Mark Fendrick investigates the low profile 'launch' of the QL.

As usual, when it comes to Sinclair technology, the United States is far behind the United Kingdom. The wait is over, however, for the QL. Available first from American Express, towards the end of 1985 it is now available from Sinclair Research Ltd., U.S.A., and from a few Sinclair dealers in this country.

Unfortunately, the Sinclair name does not carry the respect here that it does in the U.K. In fact, the mention of Sinclair computers brings to mind the Timex/Sinclair 1000 (ZX-81) which to the uninformed was nothing but a cheap toy. Hopefully, the QL will bring Sinclair back to the prominence it deserves.

But Sinclair faces quite an uphill battle to overcome the years of bad reputation that Timex created. However, at the moment Sinclair Research Ltd., U.S.A., is not doing any advertising at all. The majority (if not all) of the purchasers of the first QLs in North America are current Sinclair owners — having previously purchased anything from the original Zinclair ZX-80s, ZX-81s and Spectrums or Timex/Sinclair 1000s, 1500s, or 2068s.

In other words, if you weren't already a Sinclair afficionado, you probably aren't yet a potential QL purchaser. This situation has not been helped by the fact that Sinclair is just getting over its financial problems and the silence over the QL's capabilities. In fact, at the moment, only a single national publication contains any advertising mentioning the QL at all. These ads are for three of the dealers who are selling and supporting the Sinclair line in general, and the QL in particular. (The magazine is the only American magazine which acknowledges the existence of Sinclair with a regular monthly column.) Under these circumstances, how can any computer expect to survive?

As for the computer itself, it is everything we have expected. With all the excitement about 68000 based computers, the Sinclair QL fits right into the picture. Originally announced at a price of $499.00, when Sinclair announced its British price cut, the American model was reduced to its current price of $299.00.

When you realise that for that price you get the computer with 128K, two microdrives, four blank cartridges, a spreadsheet, a wordprocessor (on which this column is being written), a database and a graphics program, the QL can more than compete with any of the new computers on the market. (Psion is selling the same suite of programs in MS-DOS format for $699.00 — which does not even include the computer.)

So what is the state of the QL market in the United States? Other than the lack of advertising and general public awareness it is somewhat similar to the early days of the QL's release in the U.K. When the computer first became available, the only software available was the set which comes with the QL. For some reason, Sinclair is unable to call them by their given names, so in the U.S. Abacus is just called Spreadsheet, Archive is called Database, Easel is known as Business Graphics, and Quill is Word Processor. Not very exciting, but still the same fine software — version 2.1.

The ROM version is JSU, which causes some incompatibility with available software such as QSPELL. However, unlike in the U.K., only a single ROM is available here, so that software which is now being developed for the QL in the U.S. will only have to be compatible with a single ROM version.

The amount of software available at the moment is not overwhelming, but as programs are checked for compatibility, the American QL dealers are making them available. However, the QL is targeted as a business computer, and the software which was developed for the British market doesn't meet the needs of the American business. This is being addressed by U.S. programmers such as myself who are now developing U.S. specific packages. It will probably be late in 1986 until these programs reach the market. In the meantime the British imports have the field to themselves.

QL on ICE

One of the currently popular imports is Icon Controlled Environment (I.C.E.) from Eidersoft. For those of you unfamiliar with this system, it is a system which makes cataloging, copying and backing-up files simpler than by using the SuperBASIC commands (such as dir, copy and delete). However, that is not what makes this product so popular — it is the I.C.E. screen which is its main feature. Instead of a blank screen upon pressing F1, I.C.E. shows a screen with a number of icons, or pictures — a calculator, calendar, microdrive cartridge, floppy disc, ram disk, trashcan and ESC. The time is displayed on the top, and a menu along the bottom.

A small arrow is controlled by the cursor keys, a joystick, or (soon) a mouse. By placing the arrow over the picture of one of the storage devices you have in operation, and pressing the joystick button (or space bar) twice in succession, you get a graphic directory of the files on any media in that device. (To catalogue a cartridge in microdrive 1, SuperBASIC requires that you type — dir

mdv1.)

Each file is represented by a graphic and the name of the file. The type of file determines the type of icon shown. An Archive file is represented by a filing cabinet, Easel files by a small graph, Abacus files show an abacus, and Quill files are displayed as a dog-eared sheet of paper. A SuperBASIC file shows up as a microdrive cartridge bearing the inscription SB, while executable files say EX. Any other type of files are represented by a standard file folder.

A backup cartridge can be created in one simple step by selecting the BACKUP option on the menu. In SuperBASIC, each file would need a statement to copy from one cartridge to another. (Assuming you are copying from microdrive 1 to microdrive 2, each file would need a statement such as; COPY MDV1_filenmane TO MDV2_filename.) A cartridge with many files can be quite a project! I.C.E. will even enable you to copy files from and to the same device. If you have to update a particular file which already exists on a backup cartridge, you first have to delete it (by substituting DELETE for COPY in the previous example, and then reCOPY it). With I.C.E., this is done in one quick procedure. To completely delete a file, you just have to "place it in the trashbin". Many other file handling and viewing options are simplified using I.C.E. A bonus of using I.C.E. is that each file is created with the date and time included so that when you use the INFO menu option, you know when the last update was made.

By selecting the calculator, a calculator appears on the screen which you can use as needed, and the calendar page opens a window with a calendar. This calendar starts with the present month, and you can move back and forth as required. If you use either of these features while a directory is on the screen, it is still intact when you remove them.

I.C.E. is supplied on a ROM cartridge which fits into the slot on the back of the QL, so it is always available, using virtually no RAM (a so-called Front end program). A microdrive cartridge is also included (although many dealers are now selling each component individually), containing CHOice. CHOice contains mailmerge, multitasking and ramdisk capabilities. To fully make use of the multitasking and ramdisk features, you should, however, have more than the 128K that comes with the QL. The ramdisk ability is especially useful when using a program, such as Quill, which swaps information back and forth from storage particularly when the file gets so large that Quill sets up a temporary file (def_tmp). When setting up and directing data to a section of RAM, this makes the transfer of data almost instantaneous. Keep in mind, however, that this information will be lost unless it is ultimately copied to a permanent storage medium. I.C.E. makes this procedure a snap.

A major drawback of I.C.E., however, is of concern to those who use F2 because they are using a TV or their monitor overscans on the F1 setting. Using F2 causes the menu portion of the screen not to show up. For all practical purposes this makes I.C.E. unsuitable for those who cannot use F1.

The most ambitious QL dealer at the moment is Curry Computer (Post Office Box 5706; Glendale, AZ 85312-5607; U.S.A.; (602) 978-2902; telex (via WUI): 6501267701), who has a large catalogue for the QL which is expanding with each passing day.

It has been a while since I let you in on the "secret" of getting in touch with me — and I do so love to hear from all of you on both sides of the Atlantic.

Address correspondence to:
Mark L. Fendrick, Post Office Box 2392, Secaucus, NJ 07094-0992, U.S.A.

ARE YOU A BUDDING PROGRAMMER?

ZX is always looking for top quality games and utilities for publication. If you have a top notch game or a useful utility for the Spectrum or QL why not send it to us for appraisal on cassette or microdrive complete with a listing if possible.

There is also our new feature Short Cuts to showcase your practical, novel or imaginative short routines with cash prizes for published listings. For longer programs we pay competitive rates, and if you have an idea for an article or series for ZX — drop us a line or phone Bryan or Cliff on 01-437 0626 to talk it over.



MACHINE CO

If you're tired of crashing code, here's a routine that allows you to check the effects of your m/c programs before you run them.

by T.E. Watts

Everyone who has attempted to program in machine code will be aware of (if not very familiar with) the routine: enter code. . .save code. . .test. . . CRASH!. . .unplug. . .plug in. . .reload. . .print addresses and trace. . .amend. . .save. . . test. . .CRASH!!. . .(expletive deleted) and so on.

This program saves all the frustration and a great deal of time by tracing your machine code routines step by step, showing the contents of the registers before and after each instruction and printing the contents of any address. The registers can be preset to any desired value as can the stack pointer. A separate stack from that used by the Basic system is set up which avoids problems of stack balancing and makes it very easy to check that your routine does balance the stack. The address of the instruction to be executed can, of course, be changed and a facility is included to put an address on the stack or to change the address to the last entry on the stack. The alternate register set is not printed, but is preserved and can be used.

Unfortunately, owing to the screen usage of the program and (if they are used) the complexity of the ROM routines, screen printing routines will produce little or no visible results. However, the state of all registers and all stores is known at all stages so that in practice there is no real difficulty in testing such routines.

The heart of the program is the machine code routine at address 6D5E (decimal 27998) which is accessed via line 710. As the alternate register pair H'L' is used by the USR routine, provision has been made to preserve and restore its contents by the routines at addresses 6D7F-6D83 and 6D90-6D97. The rest of the code is quite straightforward and should present no difficulty.

The Basic program sets up initial values for the registers and stack pointer and prints these values. It also keeps track of the address of the next instruction and copies the appropriate number of bytes to addresses 6D88-6D8B. The construction of the program is outlined in Table 1, functions are listed in Table 2 and variables in Table 3.

Entering the program

You should first enter the Basic program and after checking the listing for errors save it with the command SAVE "mctp" LINE 1.

The machine code routine (Listing 2) can then be entered. Carefully check your loaded code (which shouldn't take too long since the routine is so short) and save it immediately after the Basic program when prompted.

In use

When saved as above, the command LOAD "mctp" will load and autostart the program. The machine code routine is loaded if necessary and the program stops with the question "Do you want instructions?". You are then asked if you wish to load a named machine code routine; this will normally be the routine you want to test and it should be saved on tape so that the command LOAD "name" CODE will load it to the correct location. The location of your code *must* be above 6DA4 (decimal 28068).

Apart from the name of a routine to be loaded and one other option which we will come to shortly, all input to the program is either a number or a single letter, "y" or "n". All

numbers may be in either decimal or hexadecimal; hex numbers must be either 2 or 4 digits long and followed by "h" (e.g. 4 can be input as "4" or "04" or "04h" or "0004h"). Letters, whether as part of a hex number or a reply to a question, may be either upper or lower case. But remember that there is no syntax check on numbers and an entry such as "04D1" (i.e. "h" missing from a hex number) will produce the report "440.1 : Nonsense in Basic" or a similar error halt. If this happens then restart the program by typing "GO TO 600".

The program now needs to be told the address that it starts testing from and initial values for all registers; a location in an unused part of RAM must be selected for use as the stack.

The program then enters the main loop. The current location is printed in both decimal and hexadecimal and the contents of this and the next three locations are displayed in hex code. You now enter the number of bytes in the instruction or a code value to get to the required facility. The result of entering the different possible values is as follows:

Number from 1 to 4:
The number of bytes specified is executed and the state of the registers after execution is displayed.

Zero entered:
The program asks "Skip/go to?". Entering 0 to 4 causes the current address to be increased by the number. Entering a number higher than four changes the current address to the number entered and will ask if you wish to put a number on the stack (use this facility if the instruction is CALL), entering "s" changes the current address to the last entry on the stack and increments the stack pointer (use this facility if the instruction is RET). All these options are followed by the opportunity to change the contents of the registers and stack pointer. A number less than zero can be entered and this will stop the program.

Number greater than 4:
This is the same as entering more than four in response to the 'skip/go to' question above.

The current address is changed and you can put a number on the stack. The register contents can be changed.
The program stops if you try to enter any number less than zero.
All the above options (except those which stop the program) are followed by the question "Print locations?". Entering "y" produces the response "Start at?" followed by "How many/End at?" and the appropriate locations are printed in decimal and hex (if the second number is greater than the first then the program assumes it to be an end location). After printing, the program returns to the question "Print locations?" and further locations can be printed. Entering anything other than "y" takes the program back to the start of the main loop.

If you have stopped the program and you wish to restart at the same location and with the same data then use the command GO TO 600. RUNning the program will require you to reinitialise the registers and stack pointer; however any data above location 6D5D (27997) will be unaffected and the test in line 5 will avoid the necessity of reloading the program's machine code routine. You can, of course, RUN the program in order to load and test a different machine code routine.

DE TESTER

Testing routines which change address

When testing a routine which includes instructions such as CALL, RST, JP, JR, RET you should not execute the jump instruction but should change the next address to the appropriate value, and for CALL instructions put the return address (usually current address + 3) on the stack. If you have done this for a CALL then the corresponding RET is followed by executing zero bytes and entering "s" in response to the 'Skip/go to' question.

This action is necessary because executing an instruction which transfers control to another address will take the program counter outside the limits of the test control routine with no guarantee that control will ever be properly returned. Of course a tested routine can be called but you should be certain that it is fully tested and always returns satisfactorily.

Figure 1. An example of the screen display showing the current address, the instruction it contains and its effect on the register sets.

```
Location:  28016       6D70h

Instruction:  ED 73

Before:
A   1     01    F   5      05    261
B   65    41    C   0      00    16640
D   54    36    E   1      01    13825
H   123   7B    L   6      06    31494
        IX    0        0000
        IY    0        0000
        SP    60000    EA60
After
A   1     01    F   5      05    261
B   65    41    C   0      00    16640
D   54    36    E   1      01    13825
H   123   7B    L   6      06    31494
        IX    0        0000
        IY    0        0000
        SP    60000    EA60
```

Listing 1. The Basic control program.

```
  5 IF PEEK 28016<>237 OR PEEK 28017<>115 THEN  CLEAR 27997:  LOAD "mcto"CODE
 10 LET hb=0: LET lb=0: LET y=256: LET a=0: LET l=27991
 11 LET c=28012: LET d=28013: LET e=16: LET c3=3: LET c5=5: LET c2=2: LET c1=1: LET c0=0
 20 LET b$="0123456789ABCDEF"
 30 LET n$="": FOR i=c0 TO 15: LET n$=n$+CHR$ i: NEXT i
 40 LET z$="AFBCDEHL"
 50 DEF FN h$(z)=b$(INT (z/e)+c1)+b$(z-e*INT (z/e)+c1)
 60 DEF FN a(z)=CODE n$(CODE a$(z)-47-(7 AND (CODE a$(z)>57))-(32 AND (CODE a$(z)>96)))
 70 DEF FN n(a$)=e*FN a(c1)+FN a(c2)
 80 LET a$="n": GO TO 500
100 FOR i=28001 TO 28007 STEP c2: PRINT AT (i-l)/c2+a,c3;PEEK i;"  ";AT (i-l)/c2+a,8;FN h$(PEEK i);AT (i-l)/c2+a,e;PEEK (i-c1);"  ";AT (i-l)/c2+a,21;FN h$(PEEK (i-c1));AT (i-l)/c2+a,26;y*PEEK i+PEEK (i-c1);"    ": NEXT i
110 PRINT AT a+c5,c0;"A";AT a+c5,13;"F";AT a+6,c0;"B";AT a+6,13;"C";AT a+7,c0;"D";AT a+7,13;"E";AT a+8,c0;"H";AT a+8,13;"L"
120 PRINT "     IX    ";y*PEEK i+PEEK 28008;"     ";AT a+9,17;FN h$(PEEK i);FN h$(PEEK 28008)
130 PRINT "     IY    ";y*PEEK 28011+PEEK 28010;"     ";AT a+10,17;FN h$(PEEK 28011);FN h$(PEEK 28010)
140 PRINT "     SP    ";y*PEEK d+PEEK c;"     ";AT a+11,17;FN h$(PEEK d);FN h$(PEEK c)
150 RETURN
200 INPUT "Set registers? "; LINE a$: IF a$<>"y" AND a$<>"Y" THEN  RETURN
205 GO SUB 210: GO SUB 100: GO TO 200
210 FOR i=c1 TO 8: INPUT CHR$ CODE z$(i);" : "; LINE a$: GO SUB 400
220 POKE 28000+i-(c2 AND (i/c2=INT (i/c2))),lb: NEXT i: LET a=c0
230  INPUT "IX : "; LINE a$: GO TO 250
240 INPUT "IY : "; LINE a$: GO TO 250
245 INPUT "Stack Pointer: "; LINE a$
250 GO SUB 400
260 POKE 28009+a,hb: POKE 28008+a,lb
270 IF a=c0 THEN  LET a=c2: GO TO 240
280 IF a=c2 THEN  LET a=4: GO TO 245
290 LET a=c0: RETURN
300 INPUT "Print locations? "; LINE a$
310 IF a$<>"y" AND a$<>"Y" THEN  RETURN
320 INPUT "Start at? "; LINE a$: GO SUB 400: LET a=y*hb+lb
330 INPUT "How many/End at? "; LINE a$: GO SUB 400: LET b=y*hb+lb: IF b<a THEN  LET b=a+b-c1
340 FOR i=a TO b STEP c2: PRINT i;TAB 9;PEEK i;TAB 14;FN h$(PEEK i);"h";TAB 22;PEEK (i+c1);TAB 27;FN h$(PEEK (i+c1));"h": NEXT i: GO TO 300
400 FOR k=c1 TO LEN a$: IF a$(k)>"9" AND a$(LEN a$)<>"h" AND a$(LEN a$)<>"H" THEN  LET a$="0": GO TO 410
401 NEXT k
405 IF LEN a$<>c5 THEN  GO TO 420
410 IF a$(c5)="h" OR a$(c5)="H" THEN  LET hb=FN n(a$): LET a$=a$(c3 TO 4): LET lb=FN n(a$): RETURN
420 IF LEN a$<>c3 THEN  GO TO 440
430 IF a$(c3)="h" OR a$(c3)="H" THEN  LET hb=c0: LET lb=FN n(a$): RETURN
440 LET hb=INT (VAL a$/y): LET lb=VAL a$-y*hb: RETURN
500 CLS : PRINT "          MACHINE CODE TEST"
510 IF a$<>"" THEN  INPUT "Do you want instructions? "; LINE a$
520 IF a$="y" OR a$="Y" THEN  GO SUB 900: CLS : LET a$="": GO TO 500
525 INPUT "Load code? "; LINE a$: IF a$="y" OR a$="Y" THEN  INPUT "Name? "; LINE a$: PRINT '"Start tape": LOAD a$CODE
530 PRINT '"Input start location: ";: INPUT  LINE a$: PRINT a$: GO SUB 400: LET s=y*hb+lb
540 PRINT '"Set registers to start values": GO SUB 210
600  CLS : PRINT "Location: ";s;TAB 19;FN h$(INT (s/y));FN h$(s-y*INT (s/y));"h"
610 PRINT '"Instruction: ";: FOR i=c0 TO c3: PRINT FN h$(PEEK (s+i));" ";: NEXT i
620 PRINT ''"Before:": LET a=c0: GO SUB 100
630 INPUT "no of bytes to be executed? "; LINE a$: GO SUB 400: LET a=y*hb+lb: IF a<c0 OR a>c5 THEN  GO TO 660
640 IF a<>c0 THEN  GO TO 700
650 INPUT "Skip/goto (""s"" for stack)? "; LINE a$: IF a$<>"s" THEN  GO SUB 400: LET a=y*hb+lb: GO TO 660
655 LET b=y*PEEK d+PEEK c: LET a=y*PEEK (b+c1)+PEEK b: LET a$=STR$ (b+c2): GO SUB 400: POKE c,lb: POKE d,hb: GO TO 665
660 IF a>4 THEN  INPUT "Number to stack? "; LINE a$: IF a$="y" OR a$="Y" THEN  INPUT "Number? "; LINE a$: GO SUB 400: LET b=y*PEEK d+PEEK c-c2: LET a$=STR$ b: POKE b,lb: POKE b+c1,hb: GO SUB 400: POKE c,lb: POKE d,hb
665 IF a>4 THEN  LET s=a: GO TO 690
670 IF a<c0 THEN  STOP : GO TO 600
680 LET s=s+a
690 GO SUB 300: GO SUB 200: GO TO 600
700 FOR i=c0 TO a-c1: POKE 28040+i,PEEK s: LET s=s+c1: NEXT i: FOR i=a TO c3: POKE 28040+i,c0: PRINT AT c2,13+c3*i;"  ": NEXT i
710 RANDOMIZE USR 28014
720 PRINT AT 12,c0;"After": LET a=8: GO SUB 100
730 GO SUB 300: GO TO 600
900 PRINT '"          Instructions"
910 PRINT '"  Numbers may be expressed in  decimal or hex.  Hex form needs 2 or 4 digits followed by ""h""."'"Reply to other questions is ""y"" or ""n"".  Letters can be upper orlower case."
920  PRINT '"  Executing 0 bytes allows you to skip up to 4 bytes or go to anew location, and change the   registers.  A negative number  stops the program."
940 PRINT ''"Press any key to continue": PAUSE c0: RETURN
```

Listing 2. Machine code routine.

```
10 CLEAR 27997
20 FOR 27998 TO 28070
30 READ a: POKE i,a
40 NEXT i
50 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,237,115,94,109,49,96,109,241,193,209,225,221,225,253,225,51,51,217,227,217,237,123,108,109,0,0,0,0,237,115,108,109,49,110,109,217,227,217,59,59,253,229,221,229,229,213,197,245,237,123,94,109,201,0,0,
60 SAVE "mcto"CODE 27998,71
```

Ray Elder with more advice for the ZX81 user on building machine code routines.

Last month we created a program to create a giant REM to hold our collection of machine code routines which I hope YOU will help me to develop.

Meanwhile I hope experienced users will excuse me as I realised that we often take for granted things which may confuse relative newcomers, so I will recap on a few well known bits and pieces from time to time.

The ZX81 has a special area of RAM memory which it looks at 50 times a second and transfers to the TV screen, this is called the display file and it has one disadvantage and one advantage when compared to the Spectrum (ignoring colour and hi-res that is).

The disadvantage is that it moves around in memory whilst the Spectrum's always stays where it is, and the advantage is that you can POKE characters directly to it from BASIC or machine code which you can't on the Spectrum.

To find out where the display file memory is at any particular time Sir Clive supplied us with two addresses which will tell us its start address MINUS one. These are addresses 16396 and 16397 and a simple program to use this might be as follows:

10 LET A=1+PEEK 16396+256×PEEK 16397
20 POKE A,128

And inverse space should appear in the top left corner of the screen, 128 being the code for an inverse space!

Now we've found it, we must know how it is laid out and for this I am presuming that 16K is being used, 1K users-hard luck!

Each line consist of 32 characters PLUS a special marker for the "end of line", the machine was designed like this to maximise the efficiency when only using 1K, and in fact using the built in SCROLL function will almost certainly destroy this pattern due to it dotting end of line codes all over the place.

In general use the CPU manages to make sense of all this and cope, but if we are PEEKing and especially POKEing then a system crash is very likely.

Why? Because if the end of line code is overwritten then the CPE does get confused and pulling the plug is usually the only way out. The end of line character by the way is number 118, the same as the NEWLINE code.

This issue I have given a simple screen manipulating routine and a REM extender. They are both relocatable and can be entered to any address you desire, making sure of course that they do not overlap. I give the length for each with the code.

Those who created our giant REM last month can simply RUN the loader program given, enter the address and type in the HEX CODES which follow the LET X$=" lines, suggested addresses are given and for those who missed last month's article (shame on you) type in the program as written ADDING a line 1 REM ... with at least 100 dots following it. For you program A is essential, for the rest program A may prove of use later on.

PROGRAM A

```
  2 REM PROGRAM A,ADDRESS 16514
  3 REM LENGTH 22 BYTES
 10 LET X$="2A7F40110340195E235
62B19117F40AFED52227F40C9"
 20 REM ADD PROGRAM C HERE....
 30
 40
 50
```

This is a program designed to extend a REM. To use it type in a line 2 REM ... followed by as many dots as you require to ad to your existing line 1 REM. Then RAND USR start_address (16514?). If you forget to add the 2 REM then your next line which may be a program line will be added to your REM and could cause a little confusion!

```
  2 REM PROGRAM B,ADDRESS 16550
  3 REM LENGTOH 21 BYTES
 10 LET X$="01D6022A0C40237EFE7
628FAC680770B78B120F2C9"
 20 REM ADD PROGRAM C HERE....
 30
 40
 50
```

PROGRAM B

A little fun routine which simply turns everything on the screen to its inverse. Useful for effects or creating a black screen very quickly, try using in a loop such as:

10 FOR I=1 TO 50
20 RAND USR start_address (16550?)
30 NEXT I

This works by peeking at each screen position in the display file in turn, adding 128 to it and poking it back onto the display file, ignoring end of line markers of course.

```
  2 REM PROGRAM C,LOAD IN CODE
  3 REM TO REM,ADD AFTER A OR B

 20 PRINT "LOCATION ADDRESS IN
DECIMAL ?"
 30 INPUT A
 40 FOR I=A TO A+((LEN A$)/2)
 50 POKE I,16*CODE A$+CODE A$(2
)-476
 60 LET A$=A$(2 TO )
 70 NEXT I
```

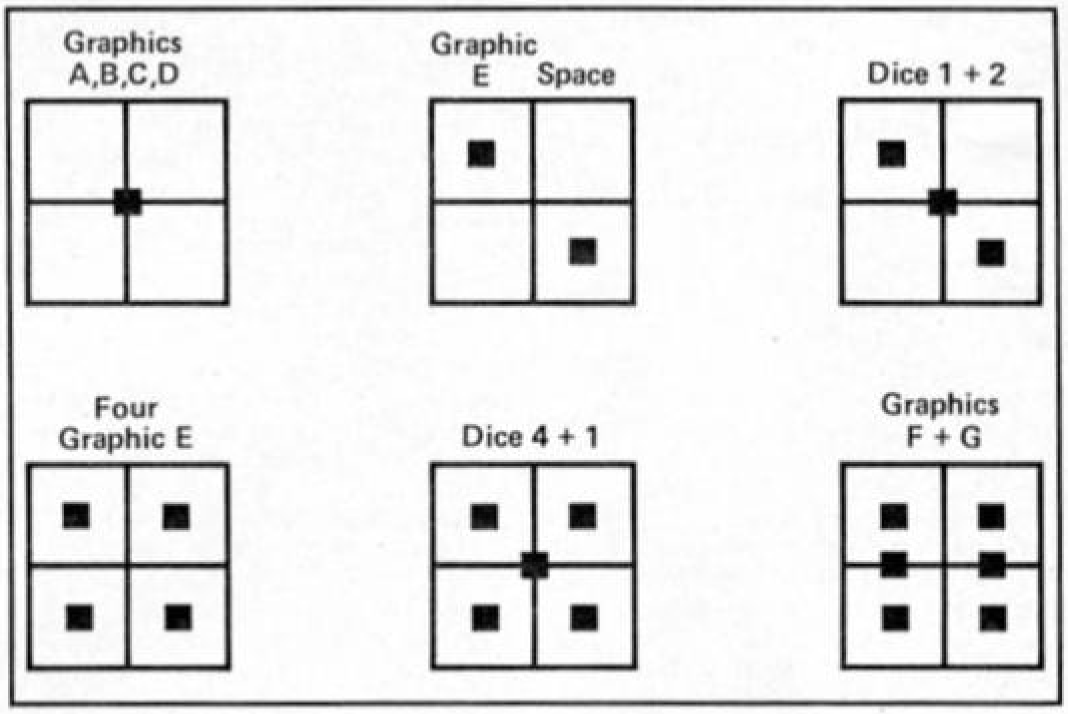
Next month I will give a set of four scroll routines left, right, down and an up scroll that doesn't mess up the display file as Sir C's does. Meanwhile keep those neat little routines coming in and we'll start using them very soon!

PAGE 81

Ray Elder introduces a new regular feature which will showcase short routines by readers.

ZX will pay £10 for each short routine published and £15 for the Routine of the Month.

We are looking for routines that are useful, imaginative or bizarre and our emphasis in judging them will be on efficiency and originality in the programming of the Spectrum or QL.



SHORT CUTS

There are several types of programming techniques, each with its own devotees and merits. Professional programmers tend to extol the virtues of "structured" programming and scream with rage at the use of a GOTO. The opposite of this is the "sit at the computer and see what develops" technique which tends to produce the infamous "spaghetti" program.

Somewhere between the two comes a type of programming which I indulge in, it is not strictly structured and tends to take advantage of Sinclair's BASIC peculiarities, I try to use memory efficiently, no doubt a throwback to my ZX81 1K days, and often, though not always, the program tends to perform better.

Dice

To illustrate some of the techniques involved in efficient programming I shall concentrate on the creation and printing of dice which can be used in many traditional games such as Snakes and Ladders, Monopoly and Yahtsee.

The first and simplest way is to create six graphic characters for each of the dice numbered 1 to 6, but personally I find the size of a single character is difficult to see and is too small for a good display.

I decided that a two by two character size was much better and by drawing out a few 16x16 grids found that a 2x2 pixel spot was effective.

If you look at the dice diagram, you will be able to spot the combinations which enable us to create the six dice of four characters (24 chars) in only seven UDG chars.

The ONE dice consists of four UDGs each with a single pixel set in one corner — ("a";"b";"c" and "d"7. The TWO dice consists of a UDG with a 2x2 pixel square in the centre ("e") plus a space character.

Now for the clever bit, using the OVER command we can combine the ONE and TWO dice to produce the THREE dice! The FOUR dice is simply four of the spot characters created for the two dice and the FIVE dice again uses the OVER command to combine the FOUR and ONE dice graphics.

Finally the SIX need two UDGs, one for the top and one for the bottom of each half of the dice ("f";"g").

Setting Up The Graphics

Simple, just set up a DATA line and read off all 56 values (7 chars of 8 lines), I created an inverted dice because setting the unspotted lines to 0 took less memory and typing than setting them to 255. And there's an awful lot of 0's.

So why not set all the first seven UDGs to blanks and then selectively "spot" them?

Program 1 is the section that creates the UDGs, Line 9900 sets all the seven UDGs to blanks and Line 9910 reads two items of data, the first being the UDG line counting from the start of the UDG area (USR "a") and the second being the value needed to create that particular spot. This was calculated by drawing each dice and calculating it with good old pencil and paper.

A Line 9920 RETURN could be added to enable the data to be set up from within a program or the data could be saved to tape or microdrive and reloaded from within a program.

Printing The Dice

Program 2 performs this function, it can either be added to program 1 or used after the data has been loaded from tape.

Line 9500 picks a random number between 1 and 6 and

stores it in variable "no". ON return from this routine the dice value can be picked up from this variable.

The printing of each dice is performed by line 9501 for 1, 9502 for 2, 9503 for 3 etc. So by using a calculated GOTO (structured programmers are tearing their hair out) we can easily print the correct dice, after setting the PRINT position. This position is determined before the routine is called by setting the x — horizontal — and y — vertical — positions.

Notice that the characters underlined are obtained in GRAPHIC mode and if you have run program 1 before entering this program then you will get a set of spots rather than the letters shown.

Using The Dice

Program 3 demonstrates some ways of using the dice. Program 2 MUST be present and program 1 graphics must be in place. Line 10 assumes that Lines 9900, 9910, 9920 and 9990 are in the machine, remove it if you have used the tape based data storage and replace by LOAD "UDGdata" CODE. (note Line 9920 is not shown in program 1 and should consist of 9920 RETURN)

For this simple program it is best to have all three programs in the Spectrum at the same time.

Line 100 shows how a single dice may be "rolled," Line 200 shows how two (or more) dice can be rolled, apparently at the same time! Lines 300 to 400 shows how the dice can be used in a game, I have deliberately kept it simple in order to encourage you to improve on it or create your own game.

And So . . .

Its over to you, we are looking for those short, efficient, clever games, routines and utilities and not just in BASIC either. The most efficient code is usually Machine code so anyone submitting a MC routine could well have an advantage . . .

Send your submissions to Short Cuts, ZX Computing Monthly, No 1 Golden Square, London W1R 3AB.

PROGRAM 1

```
9900>FOR i=USR "a"TO USR "h":POK
E i,0:NEXT i
9910 FOR i=1 TO 12: READ x,y: PO
KE USR "a"+x,y: NEXT i
9990 DATA 7,1,15,128,16,1,24,128
,35,24,36,24,43,24,44,24,47,24,4
8,24,51,24,52,24
```

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PROGRAM 2

```
9500>LET no=INT (RND*6+1):GO SUB
 9500+no:RETURN
9501 PRINT AT y,x; INK 7; PAPER
0;"AB";AT y+1,x;"CD": RETURN
9502 PRINT AT y,x; INK 7; PAPER
0;"E ";AT y+1,x;" E": RETURN
9503 PRINT AT y,x; INK 7; PAPER
0;"E ";AT y+1,x;" E"; OVER 1;AT
y,x;"AB";AT y+1,x;"CD"; OVER 0:
RETURN
9504 PRINT AT y,x; INK 7; PAPER
0;"EE";AT y+1,x;"EE": RETURN
9505 PRINT AT y,x; INK 7; PAPER
0;"EE";AT y+1,x;"EE"; OVER 1;AT
y,x;"AB";AT y+1,x;"CD"; OVER 0:
RETURN
9506 PRINT AT y,x; INK 7; PAPER
0;"FF";AT y+1,x;"GG": RETURN
```

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PROGRAM 3

```
 8 REM set up graphics
 9
 10 GO SUB 9900
 97
 98 REM Demo single dice roll
 99
 100 LET y=6: LET x=10: FOR i=1
TO 20: GO SUB 9500: PRINT AT 10,
10;no: PAUSE 10: NEXT i: CLS
 197
 198 REM Demo sequence of dice
 199
 200 FOR i=1 TO 20: LET y=1: LET
 x=10: GO SUB 9500: LET x=21: GO
 SUB 9500: NEXT i: CLS
 297
 298 REM simple game demo
 299
 300 PRINT AT 0,10;"HIGHER/LOWER
": LET y=4: LET x=15: FOR i=1 TO
 20: GO SUB 9500: NEXT i: LET a=
no
 320 PRINT AT 10,0;"Press H - Hi
gher or L - Lower."
 330 LET g$=INKEY$: IF g$<>"h" A
ND g$<>"l" THEN  GO TO 330
 340 PRINT AT 10,0;"Press S to s
top the dice at a   "+("lower" A
ND g$="l")+("higher" AND g$="h")
+" value": LET y=14
 350 GO SUB 9500: IF INKEY$<>"s"
 THEN  GO TO 350
 360 IF (g$="h" AND no>a) OR (g$
="l" AND no<a) THEN  PRINT AT 19
,0;"  Well done, you win this ti
me": GO TO 380
 370 PRINT AT 19,0;"  Oh dear, y
ou lost this time"
 380 PRINT '" Press SPACE to try
 again......"
 390 IF INKEY$<>" " THEN  GO TO
390
 400 GO TO 300
```

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SHORT CUTS

D.I.Y.

MEGA-DRIVE

Listing 1

This is the loader program for entering the machine code. Type it in and RUN it, and enter the m/c from listing 2.

```
  1 REM listing 1
  5 LET CHK=0
 10 FOR F=25000 TO 27513
 20 INPUT "Byte:";A
 30 PRINT F,A
 35 LET CHK=CHK+A
 40 POKE F,A: NEXT F
 50 IF CHK<>225053 THEN  PRINT
AT 0,12; FLASH 1;"ERROR!"
```

Listing 2

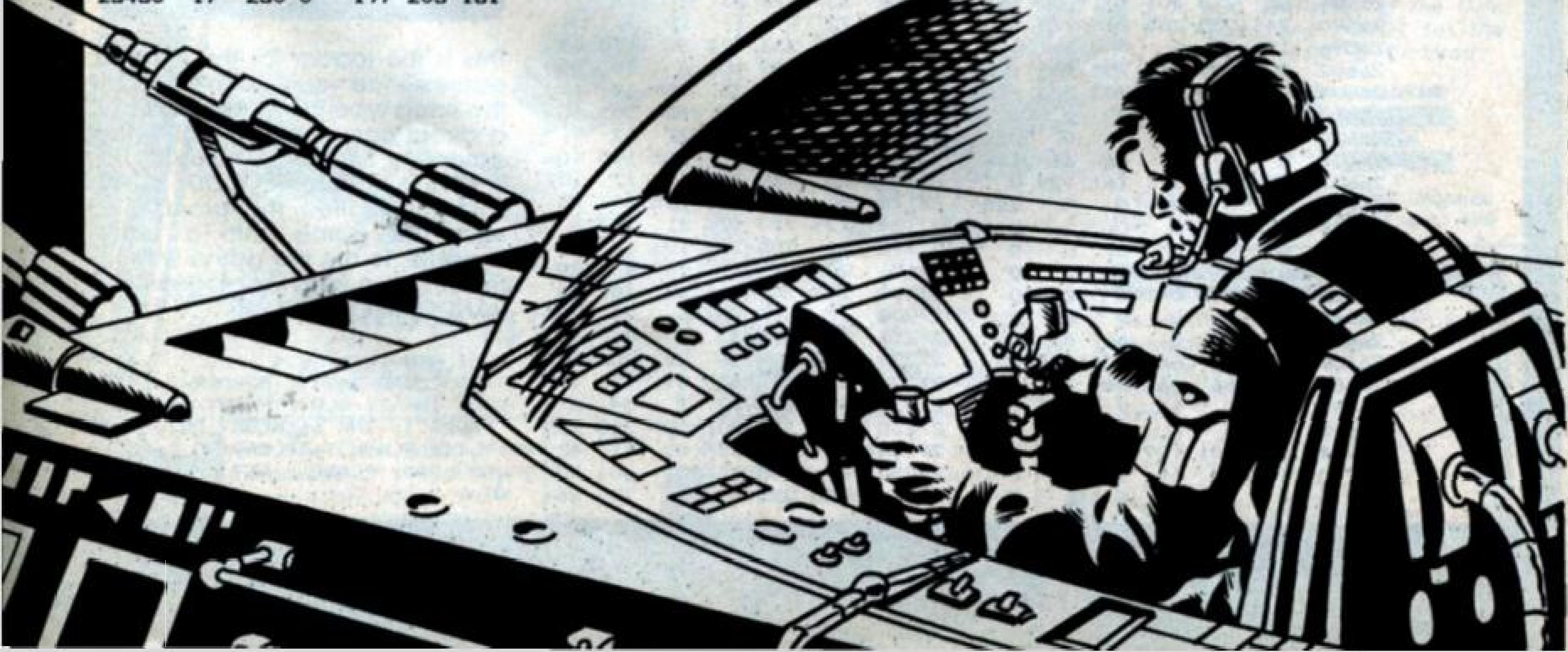
The numbers in the left hand column are the memory addresses for the code — don't type these in, just type in the numbers in the second column onwards, typing ENTER after each one. There is a check built into listing 1, so if you've made a mistake it will tell you. If this happens delete listing 1 line by line (don't type NEW) and enter listing 3.

25000	243	205	108	98	205	140
25006	105	205	46	99	205	43
25012	100	58	203	103	167	196
25018	136	103	205	84	103	205
25024	103	101	205	149	98	205
25030	174	101	205	21	101	205
25036	140	98	205	120	102	205
25042	226	99	205	69	99	58
25048	210	104	254	48	40	203



Mega-Drive is a machine code arcade game for the Spectrum (all versions), in which all you have to do is blast the enemy ships before they blast you! Your force field can take nine hits before it's destroyed: controls are Z/X = left/right and Symbol Shift = fire.

25054	24	210	203	28	203	28
25060	203	28	1	32	0	9
25066	203	20	203	20	203	20
25072	201	203	28	203	28	203
25078	28	198	0	1	32	0
25084	237	66	203	20	203	20
25090	203	20	201	124	230	24
25096	203	47	203	47	203	47
25102	198	88	103	201	58	73
25108	98	8	229	229	58	72
25114	98	79	229	6	8	26
25120	119	19	36	16	250	225
25126	35	13	32	242	225	8
25132	61	40	7	8	167	205
25138	241	97	24	225	225	201
25144	205	5	98	58	190	103
25150	119	35	119	205	241	97
25156	119	43	119	201	2	2
25162	197	213	229	26	111	38
25168	0	41	41	41	235	33
25174	0	60	25	235	225	6
25180	8	229	26	119	19	36
25186	16	250	225	209	19	35
25192	193	16	223	201	33	0
25198	64	17	1	64	1	255
25204	23	54	0	237	176	62
25210	7	33	0	88	17	1
25216	88	1	255	2	119	237
25222	176	175	205	155	34	201
25228	1	100	0	11	120	177
25234	32	251	201	58	69	105
25240	61	50	69	105	192	62
25246	33	50	69	105	17	211
25252	104	6	20	197	26	103
25258	19	26	111	229	205	5
25264	98	126	225	254	7	32
25270	2	203	166	205	224	97
25276	125	18	124	27	18	19
25282	19	229	205	5	98	126
25288	225	254	7	32	2	203
25294	230	26	61	18	40	5
25300	19	193	16	207	201	62
25306	23	18	27	27	229	205
25312	5	98	126	225	254	7
25318	32	2	203	166	1	224
25324	16	237	66	124	18	125
25330	19	18	19	19	193	16
25336	174	201	33	71	105	17
25342	15	105	1	54	0	237
25348	176	62	1	50	41	100
25354	50	42	100	61	50	197
25360	103	50	203	103	62	17
25366	50	198	103	60	50	202
25372	103	62	10	50	216	99
25378	33	173	80	34	192	103
25384	62	57	50	210	104	201
25390	6	12	33	197	104	54
25396	48	35	16	251	33	0
25402	64	17	165	104	6	32
25408	205	74	98	24	181	58
25414	41	100	167	192	58	210
25420	104	61	50	210	104	254
25426	48	40	44	6	5	197
25432	6	6	197	42	192	103
25438	205	5	98	120	60	205
25444	45	101	193	38	0	104
25450	17	250	0	197	205	181
25456	3	193	16	230	193	16
25462	224	62	1	50	41	100
25468	175	50	42	100	201	175
25474	6	40	197	17	205	103
25480	42	192	103	58	215	99
25486	167	32	10	17	5	18
25492	62	1	50	215	99	24
25498	4	175	50	215	99	205
25504	27	101	193	38	0	104
25510	17	44	1	197	205	181
25516	3	193	16	212	33	75
25522	72	17	217	99	6	9
25528	205	74	98	33	75	89
25534	17	76	89	1	9	0
25540	54	7	237	176	6	6
25546	197	1	232	253	11	120
25552	177	32	251	193	16	244
25558	201	0	10	71	65	77
25564	69	32	79	86	69	82
25570	58	42	100	61	50	42
25576	100	192	60	50	42	100
25582	42	192	103	205	5	98
25588	43	126	254	7	40	5
25594	175	50	41	100	201	1
25600	32	0	237	66	237	66
25606	126	254	7	40	5	175
25612	50	41	100	201	35	35
25618	35	35	126	254	7	40
25624	5	175	50	41	100	201
25630	9	9	126	254	7	200
25636	175	50	41	100	201	1
25642	1	58	194	103	61	50
25648	194	103	32	67	62	10
25654	50	194	103	62	254	219
25660	254	230	2	32	25	42
25666	192	103	62	161	189	40
25672	46	43	34	192	103	229
25678	205	21	101	225	35	35
25684	35	205	63	101	24	29
25690	62	254	219	254	230	4
25696	32	21	42	192	103	62
25702	188	189	40	13	35	34
25708	192	103	229	205	21	101
25714	225	43	205	63	101	58
25720	199	103	61	50	199	103
25726	192	62	6	50	199	103
25732	58	197	103	167	32	52
25738	42	192	103	17	32	0
25744	237	82	237	82	35	34
25750	195	103	62	127	219	254
25756	230	2	192	62	1	50
25762	197	103	205	241	97	50
25768	73	98	50	72	98	17
25774	61	104	229	205	18	98
25780	225	34	195	103	205	5
25786	98	54	71	201	42	195
25792	103	205	241	97	62	1
25798	50	73	98	50	72	98
25804	229	17	53	104	205	18
25810	98	225	34	195	103	229
25816	205	5	98	54	71	225
25822	205	224	97	62	7	17
25828	21	104	229	205	18	98
25834	225	229	205	5	98	54
25840	7	225	58	198	103	61́
25846	50	198	103	40	10	38
25852	0	111	17	15	0	205
25858	181	3	201	175	50	197
25864	103	62	17	50	198	103
25870	205	241	97	205	18	98
25876	201	42	192	103	17	205
25882	103	62	3	50	73	98
25888	50	72	98	229	205	18
25894	98	225	205	5	98	62
25900	6	6	3	197	6	3
25906	119	35	16	252	17	35
25912	0	237	82	193	16	241
25918	201	62	4	50	73	98
25924	62	1	50	72	98	17
25930	21	104	205	224	97	229
25936	205	18	98	225	205	5
25942	98	62	7	119	17	32
25948	0	237	82	119	237	82
25954	119	237	82	119	201	58
25960	200	103	61	50	200	10
25966	192	62	2	50	200	103
25972	62	3	50	72	98	62
25978	1	50	73	98	42	192
25984	103	205	224	97	17	69
25990	104	58	201	103	167	32
25996	13	1	24	0	235	9
26002	235	62	1	50	201	103
26008	24	4	175	50	201	103
26014	229	205	18	98	225	205
26020	5	98	62	67	119	35
26026	119	35	119	201	58	70
26032	105	61	50	70	105	192
26038	62	55	50	70	105	62
26044	2	50	73	98	61	50
26050	72	98	17	15	105	6
26056	18	197	26	167	32	7
26062	19	19	19	193	16	245
26068	201	103	19	26	111	19
26074	26	213	17	21	104	245
26080	229	205	18	98	225	229
26086	205	5	98	54	7	1
26092	32	0	237	66	54	7
26098	225	205	224	97	241	167
26104	32	5	205	92	102	24
26110	3	205	106	102	209	27
26116	27	26	254	80	32	7
26122	19	26	254	160	48	55
26128	27	124	18	19	125	18
26134	19	19	213	229	17	117
26140	104	58	204	103	167	32
26146	13	62	1	50	204	103
26152	1	16	0	235	9	235
26158	24	4	175	50	204	103
26164	205	18	98	225	205	5
26170	98	54	4	1	32	0
26176	237	66	54	4	209	24 ▶ ▶ ▶



26182	15	38	64	125	46	128
26188	149	111	27	124	18	125
26194	19	18	19	19	193	5
26200	194	201	101	201	203	28
26206	203	28	203	28	43	203
26212	20	203	20	203	20	201
26218	203	28	203	28	203	28
26224	35	203	20	203	20	203
26230	20	201	58	197	103	167
26236	200	42	195	103	229	205
26242	241	97	205	5	98	126
26248	225	254	4	192	62	1
26254	50	73	98	50	72	98
26260	17	21	104	175	50	197
26266	103	62	17	50	198	103
26272	229	205	18	98	225	229
26278	205	5	98	54	7	225
26284	205	241	97	235	33	15
26290	105	6	18	197	122	190
26296	32	67	35	123	190	32
26302	63	58	202	103	61	50
26308	202	103	32	5	62	1
26314	50	203	103	43	62	2
26320	50	73	98	54	0	35
26326	54	0	235	17	149	104
26332	229	205	18	98	225	229
26338	205	5	98	54	7	1
26344	32	0	237	66	54	7
26350	205	4	103	225	17	21
26356	104	205	18	98	193	205
26362	44	103	201	35	35	35
26368	193	16	178	201	6	100
26374	197	38	0	104	17	3
26380	0	205	181	3	193	16
26386	243	201	17	203	104	1
26392	6	0	237	176	33	203
26398	104	1	48	4	121	190
26404	32	5	54	48	35	16
26410	247	201	33	200	104	52
26416	6	3	126	254	58	56
26422	7	214	10	43	52	35
26428	24	245	119	43	16	240
26434	33	197	104	205	20	103
26440	33	6	64	17	203	104
26446	6	6	205	74	98	201
26452	33	31	64	17	210	104
26458	6	1	205	74	98	201
26464	65	84	84	65	67	75
26470	32	87	65	86	69	32
26476	67	79	77	80	76	69
26482	84	69	32	32	32	32
26488	32	32	32	32	32	32
26494	32	32	32	32	32	32
26500	32	32	32	32	33	5
26506	72	17	96	103	6	20
26512	205	74	98	6	40	197
26518	205	4	103	205	162	98
26524	193	16	246	42	192	103
26530	58	210	104	229	245	205
26536	250	98	241	225	34	192
26542	103	50	210	104	33	5
26548	72	17	116	103	6	20
26554	205	74	98	201	7	0
26560	173	80	50	0	0	0
26566	17	26	5	1	20	0
26572	0	241	143	255	255	142
26578	1	1	1	203	239	255
26584	60	218	101	101	101	143
26590	241	255	255	113	128	128
26596	128	1	0	0	0	0
26602	0	129	142	255	195	126
26608	126	239	203	203	203	128
26614	0	0	0	0	0	129
26620	113	0	0	0	0	0
26626	0	1	1	66	66	126
26632	195	211	211	161	129	0
26638	0	0	0	0	0	128
26644	128	0	0	0	0	0
26650	0	0	0	0	0	0
26656	0	0	0	0	0	0
26662	0	0	0	0	0	0
26668	0	0	0	0	0	0
26674	0	0	0	66	66	66
26680	66	66	66	66	66	66
26686	66	66	66	66	231	231
26692	231	0	1	2	2	1
26698	0	0	0	0	166	90
26704	150	101	129	130	0	0
26710	128	64	64	128	0	0
26716	0	0	1	0	1	0
26722	0	0	0	0	101	162
26728	4	129	0	0	0	0
26734	128	0	128	0	0	0
26740	0	94	255	231	129	161
26746	82	36	24	102	189	189
26752	94	44	44	44	44	126
26758	90	90	90	90	36	36
26764	24	60	90	90	52	52
26770	52	52	52	97	4	16
26776	72	64	18	0	36	0
26782	90	128	41	9	64	10
26788	32	83	67	79	82	69
26794	32	48	48	48	48	48
26800	48	32	32	32	32	32
26806	32	32	32	32	32	32
26812	83	72	73	69	76	68
26818	83	32	57	48	48	48
26824	48	48	48	0	0	0
26830	0	0	0	0	57	64
26836	129	19	80	10	7	72
26842	79	13	64	85	21	80
26848	119	4	72	219	9	64
26854	217	17	72	44	14	64
26860	78	21	72	180	10	80
26866	68	5	72	127	12	72
26872	128	11	80	170	2	64
26878	57	22	72	244	8	72
26884	88	13	64	165	18	80
26890	51	6	64	188	18	64
26896	129	1	64	102	1	64
26902	73	0	64	175	1	64
26908	203	0	64	183	0	64
26914	222	0	64	153	1	64
26920	88	0	64	115	1	72
26926	143	0	72	108	0	72
26932	114	0	72	72	1	72
26938	52	1	72	68	1	72
26944	132	1	64	242	0	30
26950	1	64	129	1	64	102
26956	1	64	73	0	64	175
26962	1	64	203	0	64	183
26968	0	64	222	0	64	153
26974	1	64	88	0	64	115
26980	1	72	143	0	72	108
26986	0	72	114	0	72	72
26992	1	72	52	1	72	68
26998	1	72	132	1	64	242
27004	0	0	0	0	0	0
27010	0	0	0	0	0	0
27016	0	0	0	0	205	181
27022	105	205	222	105	205	156
27028	106	205	213	105	62	191
27034	219	254	230	1	32	242
27040	205	181	105	201	203	28
27046	203	28	203	28	1	32
27052	0	9	203	20	203	20
27058	203	20	201	33	0	64
27064	17	1	64	1	255	23
27070	54	0	237	176	62	7
27076	33	0	88	17	1	88
27082	1	255	2	119	237	176
27088	175	205	155	34	201	1
27094	48	2	11	120	177	32
27100	251	201	33	6	64	17
27106	101	107	6	18	205	105
27112	106	33	70	64	17	71
27118	64	1	17	0	54	255
27124	237	176	33	71	67	17
27130	72	67	1	15	0	54
27136	255	237	176	33	138	64
27142	17	239	106	6	10	205
27148	105	106	33	199	64	17
27154	249	106	6	16	205	105
27160	106	33	13	72	17	9
27166	107	6	4	205	105	106
27172	33	139	72	17	13	107
27178	6	8	205	105	106	33
27184	229	72	17	21	107	6
27190	20	205	105	106	33	37
27196	80	17	41	107	6	20
27202	205	105	106	33	101	80
27208	17	61	107	6	20	205
27214	105	106	33	197	80	17
27220	81	107	6	20	205	105
27226	106	33	128	89	17	129
27232	89	1	32	1	54	6
27238	237	176	201	197	213	229
27244	26	111	38	0	41	41
27250	41	235	33	0	60	25
27256	235	225	6	4	229	26
27262	119	36	119	36	19	16
27268	248	225	229	205	164	105
27274	6	4	26	119	36	119
27280	36	19	16	248	225	209
27286	35	19	193	16	206	201
27292	58	238	106	61	50	238
27298	106	192	62	20	50	238
27304	106	58	237	106	167	32
27310	29	58	236	106	33	0
27316	88	17	1	88	1	96
27322	0	119	237	176	61	50
27328	236	106	192	62	1	50
27334	237	106	50	236	106	201
27340	58	236	106	33	0	88
27346	17	1	88	1	96	0
27352	119	237	176	60	50	236
27358	106	254	8	192	175	50
27364	237	106	62	7	50	236
27370	106	201	4	1	11	87
27376	82	73	84	84	69	78
27382	32	66	89	80	69	84
27388	69	82	32	70	79	84
27394	72	69	82	71	73	76
27400	76	49	57	56	52	67
27406	79	78	84	82	79	76
27412	83	90	46	46	46	46
27418	46	46	46	46	46	46
27424	46	46	46	46	46	76
27430	69	70	84	88	46	46
27436	46	46	46	46	46	46
27442	46	46	46	46	46	46
27448	82	73	71	72	84	83
27454	89	77	66	79	76	32
27460	83	72	73	70	84	46
27466	46	46	46	70	73	82
27472	69	80	82	69	83	83
27478	32	69	78	84	69	82
27484	32	84	79	32	83	84
27490	65	82	84	77	32	69
27496	32	71	32	65	32	32
27502	68	32	82	32	73	32
27508	86	32	69	0	0	0

Listing 3

This will print out all the machine code that you've typed in and allow you to compare it with the data in listing 2 in order to locate your mistake. Correct errors with the command POKE address, correct number.

```
 1 REM listing 3
10 LET ADD=25000
20 FOR F=1 TO 419
30 PRINT ADD;
40 FOR G=7 TO 27 STEP 4: PRINT
TAB G;PEEK ADD;: LET ADD=ADD+1:
NEXT G: PRINT TAB G+1:
50 NEXT F
```

Listing 4

This is the loader for the finished game. Once you've corrected all the errors type this in and enter as a direct command the following statement; SAVE "MEGADRIVE" LINE 1: SAVE "MEGACODE" CODE 25000, 2511 then follow the prompts to save the game onto a blank cassette. To run the game without loading it in from tape again, use RANDOMISE USR 25000.

```
 1 REM listing 4
10 CLEAR 24999: BORDER 0: PAPE
R 0: INK 7: CLS : PRINT AT 7,10;
PAPER 1; INK 6;"MEGA  DRIVE";AT
9,11; FLASH 1;" LOADING ";AT 18
,0: LOAD ""CODE : LET L=USR 2500
0
```

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RANDOM MEMORY

The riddle, "How long is a string?" is more valid than ever in the world of micros. The answer, invariably, is two — too long! There is little that can match the sheer horror of realising that your super-descriptive text adventure, already three quarters typed in, isn't going to fit into the 41K of RAM available! This article will show you ways to squeeze up your text to give you much more space.

The shortest way to get a message onto the screen is to simply PRINT it. For example:
10 PRINT "You are in a passage"
takes up 28 bytes (memory spaces) in the program area (called PROG) and nothing in the variables area (VARS). But it will take up this much space *each* time you use it. If you want to use a message more than once, do it this way: NEW the machine, then type in:
LET a$ = "You are in a passage"
without a line number (i.e. in command mode) and press ENTER. Now LIST and you'll get nothing. Not surprising, since you have no program, but your message *is* there. Type in:
10 PRINT a$
and press ENTER. Now type GOTO 10 and press ENTER again. Your message appears on screen. Magic? Not a bit of it. Your message is held in VARS only, and this is where the computer looks to find what a$ is to PRINT it. It takes up 23 bytes in VARS and eight in PROG, a total of 31 bytes. Although this is more than the first method you only use eight bytes each time you need to PRINT it, not 28; a saving of 20 bytes each time!

If you had used RUN instead of GOTO you would have seen the error message "Variable not found" because RUN clears the variables area. With this method you must use GOTO. (This means that programs which hold variables in VARS only must be SAVEd using LINE so that they autostart.)

Now I've reminded you how to use VARS only let's have a look at other ways of byte saving. (If you want more information on VARS read the mysterious Chapter 24 in your manual.)

Short cuts

The PRINT comma (CHR$ 6), attribute control characters (CHR$s 16 to 21), and the backspace control character (CHR$ 8) can also be included in strings. If a message to screen is more than 32 characters long you have to split it at a convenient point, and continue on the next line using either "'", which uses up three bytes, or by filling out the row with spaces — another byte waster. You can often save bytes by using the mysterious CHR$ 6, the PRINT comma. Including this in a string will tell the machine to continue PRINTing at the next field. If you are already more than half way across the screen this will mean "move down to the next row".

Sounds good, but how do you get these characters into a line? Try this sequence (and don't worry if strange things happen). Type in: **PRINT "A line of printing**

Now go into E mode (Caps and Symbol Shift) and, still holding down Caps Shift, press 6. The cursor will go a sickly combination of yellow on white. You will have added two control characters (16 + 6). You want the six (to give the PRINT comma) but not the 16 so press delete (Caps Shift O) to remove the CHR$ 16. The cursor jumps on half a row! Now finish the message with: **Another line below"**

Don't press ENTER yet. I want to prove that the gap between "printing" and "Another" really does exist. Move the cursor back (Caps Shift 5) and watch the 'L'. See it jump the space. *You* can see there's a space there. *I* can see there's a space there. But the computer can't, so it doesn't count it. Press ENTER and you will have two lines of printing with no wasted spaces.

You can use CHR$ 6 in other places too. In fact, anywhere you would normally use "'" or ";" in a PRINT statement. You can use extra PRINT commas before, within or after lines of printing to give extra blank lines (though there's another way I'll tell you about later). Incidentally, if you are less than half way across a row you'll need to use two PRINT commas following each other — there isn't a PRINT apostrophe!

You can use a similar method to include attribute control characters in PRINT statements. Take the line:
10 PRINT INK; PAPER 6; BRIGHT 1; FLASH 1; "TEST"
This would take up 48 bytes. You can save 31 of these if you use control characters (see page 114 of your manual). This is how you would type in the line above. (NOTE: the '/' signs are only separators — *don't* type them in.)
PRINT (E mode, Caps Shift) 1/ (E mode) 6/ (E mode) 9/ (E mode, Caps Shift) 9/ "TEST"
When you ENTER this the word TEST will be flashing, bright, blue on yellow. If you had entered it as a program line, so would the



Part two: Clyde Bish looks at more ways of saving valuable programming space.

end quotes and anything following when you listed! This won't affect the running of the program one bit, but if it irritates you you can switch back to normal by ending the line with:
(E mode) 8/ (E mode, Caps Shift) 8/ (E mode) 7/ (E mode, Caps Shift) O
but it will cost you eight bytes. (You won't run into the technicoloured listing problem, of course, if you're holding the message in VARs only.)

You can use CHR$ 8 (cursor left) with CHR$ 21 (OVER) to PRINT one character on top of another. You could use this to underline a title. Try this:

LET a$ = "A" + CHR$ 8 + CHR$ 21 + "_"
then PRINT a$ and you'll get an underlined 'A' on screen.

Token effort

Another way of saving bytes is to make use of the tokens (keywords etc) that Uncle Clive has given us. For example, the line:
20 PRINT "NEW DATA"
that you may want to use in a file handling program takes up 16 bytes, but if you use the tokens NEW and DATA from the keyboard this is reduced to only ten bytes because tokens, whatever their length, take up just one byte each. However, if you've rushed to your machine and tried to type in this line using the tokens you will have had problems. After the " sign the cursor is in L mode which will give you the letter 'a', not the keyword NEW. What you have to do is to trick the machine into giving you a K cursor. Type in the line as:
20 PRINT " THEN NEW THEN DATA"
then cursor left and delete both the THENs. Now you have what you want.

If you want some light relief from serious programming it can be quite entertaining to try to see how long a sentence you can make just using tokens and punctuation. Here's a short, silly example: **RUN VAL, COS LEN FLASH!**

Now let's extend the idea of using strings. What about a message such as "You are in a passage leading" followed by north, south, east, west, up or down? There's no need for six separate messages. Simply set up: **LET a$ = "You are in a passage leading "** (don't forget the space after "leading ") then use:
10 PRINT a$;"north"
Text is easier to read if the messages are spaced out with blank lines between. You can use PRINT commas for this, but for whole lines, you can include in your string the ENTER character (CHR$ 13): **LET a$ = CHR$ 13 + "What will you do?" + CHR$ 13.** Now type: **PRINT "test 1";a$;"test 2"** and there will be a blank row on either side of your message.

With graphics adventures, a communication window is usually used below the illustration. This means that you would have to use a line such as:
10 PRINT AT 20, 4; "You are in a tunnel"
Obviously, using a declared string for the message would save some space, but there is an even better way. CHR$ 22 is the AT control character and can be incorporated into strings in VARS just like any other control character. Here is the line which will produce the same result as the one above: **LET a$ = CHR$ 22 + CHR$ 20 + CHR$ 4 + "You are in a tunnel".** If you now **PRINT a$** your message will appear at row 20, starting at column 4.

If you have a number of messages to PRINT AT the same position you can set just the AT position as a string variable: **LET p$ = CHR$ 22 + CHR$ 20 + CHR$ 4** then use
10 PRINT p$;"your message"
when you need it. (Obviously the message could also be a variable as explained earlier.) If you wanted all your messages at the position to have certain attributes these could be added to p$. (The table on page 87 of the manual would help here.)

Having printed your message below an illustration you will also need to remove it without disturbing the picture. The usual way of doing this is:
10 PRINT AT 20, 0;
" (32 spaces) "
These blanks are very wasteful of space and can be replaced by
10 PRINT AT 20, 0,,
or even better:
LET d$ = CHR$ 22 + CHR$ 20 + CHR 0 +
" (2 PRINT commas) "
then **PRINT d$** to clear the line.

You could use a succession of PRINT commas to clear multiple lines but you could also use INPUT AT. The number of rows cleared is counted up from the bottom, and the current PRINT position must be above the area to be cleared or the screen will scroll. For example, to clear the bottom four rows use:
10 PRINT AT 17,0; : INPUT AT 4,0;
Incidentally, if you have had problems clearing a **PRINT # 0; "message"** simply use **INPUT; !**

All that I've said for CHR$ 22 also applies to CHR$ 23 (TAB) but you must have a blank space at the start of your message. (See page 80 in your manual.) Also remember that TAB affects the whole row so including attributes can produce strange results!

That's all for this issue. String along next month . . .

MINDPLAY

BY PETER SWEASEY



The glamorous life of an adventure reviewer



Enter the subterranean world of adventuring with Mindplay, but be warned, for you may never return. For the benefit of new readers (where have you been?), let me tell you my pitiful tale. I am kept, usually unfed, in these dark and dingy dungeons at the bottom of the hideously evil Argus Press Towers, to keep you informed with the world of adventuring.

I am a little distressed by the amount of new adventures being dropped through my dungeon grating by my savage editor Bryan. This month they total a phenomenal figure of one, and that's a compilation tape. And, certainly at the time of writing there seems to be little on the horizon.

I decided to try and track down two which are. One, Ocean's new Hunchback adventure, will not be out for a few weeks yet, although the adverts say 'Released January'. (I reckon they have a different calendar system to the rest of us.) Three Days In Carpathia, the sequel to a personal favourite game of mine, Valkyrie 17, written by the Ram Jam Corporation. This was first threatened for release about a year ago; Ariolasoft, who are marketing the game, tell me it will now be out in early May.

Those two to look forward to (eventually) then, but what else?

But where have all the adventures gone?

Play the game

Virtually any consumer industry does market research before releasing a product. Films, television programmes and advertising campaigns are all tested out on the public before being released. Why then does it appear that computer games are not? It seems so obvious that something as interactive as a computer program should be. Adventure games in particular benefit hugely if they are thoroughly tested beforehand.

If you are an amateur thinking of trying to market your adventure game, I urge you to have all your friends play it beforehand. Adventure games are all about anticipating what the player is going to type in, and no new author will be able to do this successfully on their own. But when other people play, the author can see the commands or vocabulary combinations that he/she missed out. For example, the game may only accept GO UP SEAT BELT, while the tester might type CLIMB BELT — it means the same thing, so should be included (this is a genuine example from Microman, reviewed later). Or the tester might think of examining objects to which no response has been given, or trying an action to which an amusing response could be programmed.

Not just minor companies need to do this. Even with major releases it would help. Take for example Lord Of The Rings. If Melbourne House had given that to any adventure reviewer worth his salt beforehand, he could have told them several easily correctable faults within half an hour. For instance the multi-layered screen presentation which squashes all the text into too small an area, causing it to scroll up too frequently for it to be referred to realistically. Or the stupid delays when you enter a location while you wait for the rest of your company to enter, one by one, and for the computer to move the little face character from one part of the screen to another. Or the unrecognisably bad location graphics which just weren't worth bothering with.

These probably seemed terribly good ideas at the programming stage, but for the player, they're just annoying. If these faults had been removed, LOR would be a masterpiece, rather than its current status, for me at least, of nice idea, shame about the execution.

Because the game has been successful sales wise the same faults will probably turn up in Part 2 of the trilogy.

FOURMOST ADVENTURES

Global Software
£7.95

There have been surprisingly few adventure compilation tapes, probably because adventure sales aren't as great as those for arcade games. This particular one is endorsed by fellow adventure hack Tony Bridge, who says on the packaging "they are excellent examples of the adventure-writers art." I'm afraid I disagree.

The first of the four games on the tape (hence the title) is Out of The Shadows from Mizar. I wouldn't really call this an adventure. It's a dungeons and dragons style thing, controlled by typing short commands, but not really a text game. Instead your little stick man judders round a graphically awful scrolling map. Other little stick creatures will attack you, causing one of those dreadful "Imp hits right leg. You lose 3 Hit Points" type routines.

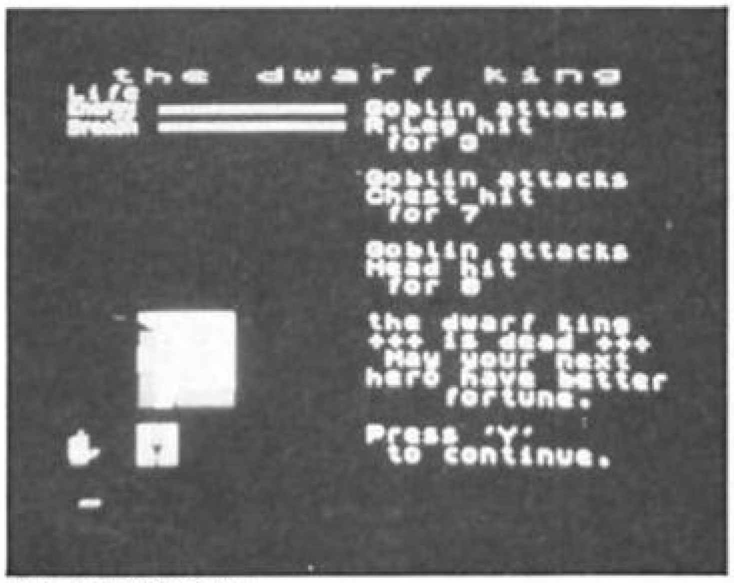
There are no problems to solve, you just move around attacking things, opening crates and the like, and amassing various treasures. It looks very primitive, although the game is large. If you like this combat and endless searching idea for a game (which obviously some people do judging by the very enthusiastic reception another magazine gave it when it first appeared), this may appeal. Personally I think it's boring rubbish.

The other three games are Quilled. The Mural is probably the best of the lot. Your quest is for an obscene mural, which you have been instructed to paint over. It's another of those Pythonesque funny adventures made popular by Fergus McNeil in Bored Of The Rings, with lots of silly things happening, and even a direct copy from Fergus in a routine with a penguin. The game is short and seems fairly simple, the vocabulary could be better, there aren't enough responses, besides which I don't find this sort of humour funny in computer games, but if you do, you may like this.

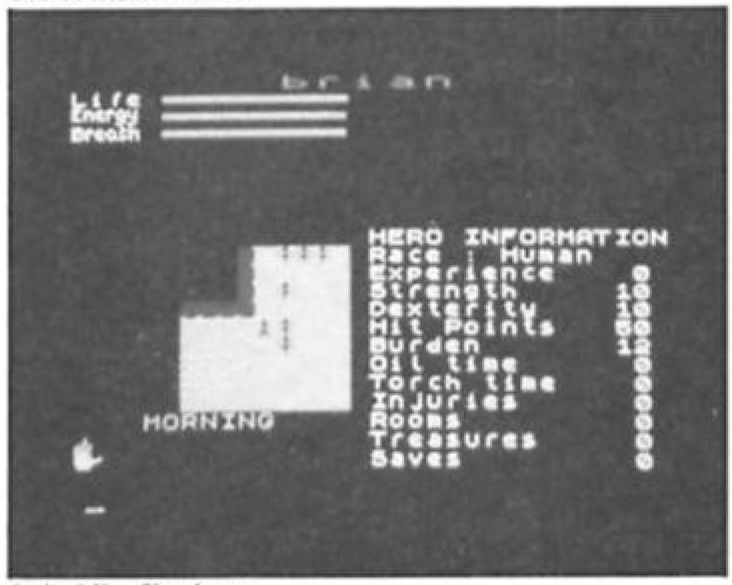
The Mural is more in the style of Fergus McNeil than his own work on the tape, Galaxias. This is a rather run of the mill sci-fi adventure in which you move around a hi-tech spaceport, then travel to various futuristic planets, searching for a crystal. It's not a spoof; rather too serious and dull in fact.

It features some reasonable graphics but a horrible typeface which is difficult to read. You seem to spend most of your time wandering around the large number of locations — there's little interaction or problem solving. The inlay rather cheekily calls this "a brand new game", although it was in fact written before his recent successes. His style has definitely improved.

In Microman you are reduced to a tiny size, and have to deal with all sorts of problems



Out of the Shadows



Out of the Shadows



Galaxias

as a result. A good idea which is reasonably executed, but let down by a far too restrictive vocabulary.

One good thing about the tape is the three true adventures do use the Quill very well, with attractive screen presentation, particularly in Microman with its split screen graphics.

None of the games really impressed me; three were average, the other I thought was appalling. At what works out at around two pounds each you might think this is worth buying; personally I'd spend it on one really good game which will keep you entertained for at least as long. Thus the potential is still there for a really good adventure compilation; this wasn't it. Disappointing.



GRIM

MINDPLAY

HELPLINE

No problems have yet arrived for me to puzzle over. This is not because you haven't sent them in response to last issue's plea: it's just that at the time of writing, the first issue hasn't even hit the streets (as us trendy media types tend to say). Still, I have to write something or the editor will stop my monthly gruel ration. So again, here's some help for problems that I suspect may be troubling a few of you intrepid adventurers.

Bored Of The Rings first. Can't open the Gate of Morona? You need a mountain top spice. You have to MOVE things from time to time — particularly in part two. For example, the MAT; or RUG maybe?

Time to dust off my red suit and start shooting some web again (not that there aren't enough cobwebs down here), for some Spiderman hints of course. A common problem is how to defeat the Ringmaster. He'll tell you if you ask him — just try to avoid that hypnotic stare of his. Gems can be found if you EXAMINE NICHE on each floor of the lift shaft, and a further gem is concealed in the desk drawer.

You need to tip the balance in the printing basement, so use everything you can (incredible how you can carry a desk and still hang on to the ceiling). When the dial reads more than 950lbs you can go to the computer lab and TYPE START. If you OPEN NEWSPAPER guess what you'll find? Correct, a gem. I think Scott Adams could think up something a little more imaginative and relevant for treasure next time.

Maze corner time. In Urban Upstart, from the bedroom in the hospital go S,E,E,N,N,W,W. But you will only be able to leave if you are wearing the white coat (like the people who come to take the editor home each evening). And in Hampstead, to find the bracket, from the entrance to the industrial estate go N,E,E,NE,E,E,NE,N, GET BRACKET, N,E,E,NE,E,N.

In the same game, you may be having cash problems. You need to cash your giro at the post office — don't forget to take the notes. (The giro can be obtained by joining the queue at the social security.) Also, a credit can be found, by sitting in the right place. And if you're going to be a true social climber, don't forget romance.

If you're still stuck in part one of the rather easy Mindshadow, a few tips. Flames will attract the attention of that ship — you'll need something to make some sparks, and something dry and brittle to light. The pirate is an alcoholic. If the crew block your way — use your natural strength. Oh, and if you have problems reading that note (as a fellow reviewer did when he was playing the game) it says "Meet me in booth 11. BM." It all makes sense when you reach Luxemburg. Also remember that SEARCH is treated differently to EXAMINE — useful when you look at the fat man.

Next time, as well as answers to the masses of your (adventuring) problems which I'm sure will have reached me by then, I'll be giving some rather useful Runestone hints.

Write to me

It's lonely down here, as well as dark and damp. So keep me busy with your puzzles: I'll try to help with any adventure for a Sinclair machine, but please give me full details of your situation, and the company that manufactures the game — even I haven't heard of every adventure available. Also remember that I want your adventure hints — so if you've recently solved something, let me know. I'll share your glory with the rest of the world too. And I'm always pleased to see any general views on adventures — if you want to recommend a game, or even disagree with one of my reviews (maybe you like Out of The Shadows) then write to me.

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Name: ....

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If you have any perplexing teasers to fox your fellow readers why not send them to ZX Computing Monthly?

An intellectual touch to the first puzzle. This is based on a genuine CSE exam question and will put your skill to the test. Look at the program in figure 1. Can you simplify it so that the end output remains the same? The program accepts two inputs and adds one number to a running total a set number of times. Single statement lines only please.

Fig 1.

```
100 LET L=O
110 LET K=O
120 INPUT A
130 INPUT B
140 IF L=B THEN GO TO 180
150 LET K=K+A
160 LET L=L+1
170 GO TO 140
180 PRINT A,B,K
```

Here is a puzzle from a reader, Mr. Ian Skillen. It is a genuine problem and we have written and given him an explanation. However, we thought you may like to test your deductive ability on it.

I wrote a simple program to select 20 numbers at random from 55 in an attempt to forecast the football pools (writes Ian). This worked perfectly and the program is shown in Fig 2. Then I decided to add a sort routine to it so that the numbers could be printed in order and the result is Fig 3. (The whole program is Fig 2 PLUS the additional code of fig 3.)

BUT it now prints each number with a blank line in between, and when scrolled and printed, using Copy, only half the numbers are printed. Help! Can you spot the problem?

Fig 2.

```
10 LET A$="01020304050607080
910111213141516171819202122232
4252627282930313233343536373
8394041424344454647484950515
25354555657585960"
20 PRINT "How many games on
the coupon?"
30 INPUT X
35 PRINT X;"Games"
40 LET B$=A$(1 TO X*2)
50 PRINT "How many
selections?"
60 INPUT Y
70 CLS
75 PRINT AT 1,1;Y;"Selections"
80 FOR I=1 TO Y
90 LET N=INT (LEN B$*RND)+1
100 IF N/2=INT (N/2) THEN LET
N=N-1
110 PRINT B$(N TO N+1)
120 LET B$=B$( TO N-1)+B$(N+2
TO )
130 NEXT I
140 COPY
150 STOP
```

Fig 3.

```
65 DIM R$(Y,40)
67 DIM S(Y,2)
110 LET R$(I)=B$(N TO N+1)
140 LET P=O
150 LET L=1
210 LET G=Y
220 LET H=L
230 LET J=G
240 LET S=-1
250 IF R$(H)<=R$(J) THEN GO TO
300
260 LET T$=R$(H)
270 LET R$(H)=R$(J)
280 LET R$(J)=T$
290 LET S=-S
300 IF S=1 THEN LET H=H+1
310 IF S=-1 THEN LET J=J-1
320 IF H<J THEN GO TO 250
330 IF H+1>=G THEN GO TO 370
340 LET P=P+1
350 LET S(P,1)=H+1
360 LET S(P,2)=G
370 LET G=H-1
380 IF L<G THEN GO TO 220
390 IF P=O THEN GO TO 450
400 LET L=S(P,1)
410 LET G=S(P,2)
420 LET P=P-1
430 GO TO 220
470 FOR I=1 TO Y
490 PRINT R$(I)
510 NEXT I
520 COPY
530 STOP
```

Answers next month.

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Rotronics Toolkit Wafer
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These two programs are designed to make life easier for users of the Spectrum cartridge based storage systems — Wafadrive and Microdrive. The Rotronics Toolkit wafer has a suite of seven Wafadrive programs, some of which have appeared as listings in Rotronics' information sheets. The first gives a screen dump in three sizes on Epson compatible printers (approx. 5.5, 11 and 16.5cm wide). The smaller sizes give slight vertical distortion — a true circle on the dump must be a horizontal ellipse on the screen — but the third gives true proportions. There are programs

SMOOTH DRIVES

Carol Brooksbank looks at two utilities for owners of microdrives and wafadrives.

for sending binary data to the printer so that bit image graphics modes can be used, for enabling the TAB command (usually inoperative with Wafadrive Interfaces) and also for letting you specify line length and left margin width. These make the Wafadrive a much more versatile printer interface.

With the Wafadrive initialised, part of the Spectrum memory is lost to its Operating System, and cannot normally be recovered without losing the program from memory. 'De-initialise' lets you do that — an important facility if you are trying to load long programs from wafers. Part of a program can be temporarily stored in the display file, the WOS de-initialised and the program transferred from the screen to its proper place.

The 'File Utility' program has nine useful menu options, letting you examine the files on a wafer, change file names without loading and re-saving, or position the tape when saving a multi-file program to achieve minimum load time. The Wafadrive's LOAD * command, which loads the first program on the wafer, requires the first item saved in a multi-file program to be the loader. Since this is frequently the last to be written, it usually means copying the whole thing to another wafer. Now you can move the last file title to the top of the directory so that it is loaded by LOAD *.

The option to change the file type seems to me to be fairly useless, because unless file type and data match, it will not load. It lets the directory show BAK for backup tapes, LST for lists and so on, but I would rather let the file title show this than have to change the directory before it can be loaded. There is a file protection option which protects a file from accidental erasure, but also from the MOVE command which might permit its salvage from a damaged wafer. It prevents the making of another wafer copy, but not a tape copy, so the protection is not really sufficient to prevent piracy. As a protected program must auto run, and include special commands if the keyboard or the Wafadrive BASIC are to be usable, its value seems limited.

One of the most useful options tries to recover a lost directory, usually caused by switching the power off with the wafer still in the drive. The handbook gives you only a 50% chance of success, but I have a faulty wafer which will only ever load in the drive in which it was formatted, and this utility loaded it in the other drive. Successful directory recovery allows you to save all the files, or, if only part of the directory was recovered, at least some of them can be salvaged. I wish there were also provision for recovering bad sectors, a much more common reason for file loss.

The final program is the 'Transfer Utility', to help in transferring commercial software to wafers. It includes tape header reading, stopping auto-run and anti-MERGE so that BASIC can be studied, counting the bytes on a tape file, de-initialising the WOS, and a simple monitor to allow you to examine and modify machine code. Using this program, and the excellent appendix on transferring software, I was at last able to get Psion's Scrabble onto a wafer. There is also provision for making Kempston compatible joysticks operate with the Wafadrive.

Wafadrive Toolkit contains some valuable programs — plus a couple with not much more than novelty value. The second program, M-DOC, is for recovering files from a damaged or faulty Microdrive cartridge.

On loading it presents 15 options, of which the one which scans the whole cartridge collecting sector details must be selected first. If you then opt for a list of all the sectors, each is listed with its number (for used sectors the filename and record number) and a status report: good, bad, missing, unreliable or unused. An unreliable sector, marked when the cartridge was formatted, will not be used, but a bad or missing one will prevent the file from loading, and these are where the program is most useful.

Files, records and sectors can be examined individually, bad sectors identified, and the Microdrive channels examined and modified. Unless you know what a Microdrive channel should consist of, you will need a book about the Microdrive before you can use this vital option. Corrected channel data is put back on the cartridge. Missing records and sectors cannot usually be recovered, but dummy replacements can be made in unused sectors so that the file can be loaded and at least some of it salvaged.

When bad and missing sectors have been replaced it is still probable that the data will have been corrupted, so there is a data filter option. If, for instance, the file is a word processor document, you can set the filter parameters so that non-text bytes are replaced by an asterisk, save it back to the cartridge, load it into the word processor and correct the asterisks. It is possible to correct data using the channel modification option, but easier to use the program which originally created the file. A useful supplementary program checks through BASIC, correcting or marking corrupted line numbers. Lines with syntax errors are noted, and heavily corrupted lines changed to REM statements. Each time the program runs one error is marked for line editing, so it can take time to correct a badly corrupted program. When the line numbers and syntax make sense, the program is reported 'ready to edit'. You must then go through it, replacing REM statements which hold the leftovers of corrupted lines, and checking the whole program before saving it again.

This is not a program for the impatient. If you want to recover lost files you must be prepared for painstaking and fiddly work, but the program is effective, provided you either know how a Microdrive file is constructed or are willing to find out before you start to use it.


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